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REPORT

OF THE

SECRETARY OF WAR;

357

BEING PART OF

THE MESSAGE AND DOCUMENTS

COMMUNICATED TO THE

TWO HOUSES OF CONGRESS

AT THE

BEGINNING OF THE SECOND SESSION OF THE FORTY-THIRD CONGRESS.

VOLUME I.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1874.

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REPORT

OF

THE SECRETARY OF WAR.

Mr. PRESIDENT: By the operation of the fifth section of the act of June 20, 1874, all unexpended balances of appropriations which had remained on the books of the Treasury for two fiscal years previous to the 1st of July last, excepting such amounts as were required to meet unfulfilled contracts at the time of the passage of said act, were carried to the surplus fund of the Treasury. This necessitated estimates by this Department for various objects, the appropriations for which have always been available at any time.

In the item for payment of arrears of pay due to officers and men of volunteers, the sum of $515,852.77 is required. Also, for payment of arrears of bounty due the same, $384,147.23. These, together with other items of a like nature, for which estimates have not been heretofore required, are now included in the aggregate estimates of the Department.

The Department is justly entitled to credit for the large sums of previous appropriations which will be turned into the Treasury as the result of the act aforesaid.

The actual expenditures of the War Department for the year ending June 30, 1873, including river and harbor improvements, were		$46,325,308 21
The same for the last fiscal year, ending June 30, 1874		42,326,314 71
Showing a reduction of		3,998,993 50
The estimates for the military establishment for the fiscal year ending June 30, 1875, were		34,410,722 89
Those submitted for the ensuing fiscal year are		32,488,969 50
Showing a reduction of		1,921,753 39
The estimates of the Chief of Engineers for fortifications, river and harbor improvements, and public buildings and grounds, and Washington aqueduct, for the fiscal year ending June 30, 1875, were		20,459,396 00
His estimates for the fiscal year ending June 30, 1876, are as follows, viz:		
Fortifications and other works of defense	$2,108,700 00	
Geographical and military surveys	399,000 00	
Improvement of rivers and harbors	13,285,500 00	
Public buildings and grounds and Washington aqueduct	678,410 50	
		16,471,610 50
Showing a reduction of		3,987,785 50

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The total estimates of the War Department, for all purposes, for the fiscal year ending June 30, 1875, were	$60,180,923 89
The same for the ensuing fiscal year are	53,144,499 00
Showing a reduction in favor of those for the ensuing year of	7,036,424 89
The estimates for the military establishment for the fiscal year ending June 30, 1876, are	32,488,969 50
The appropriations for the current fiscal year were	28,582,392 00
Excess of next year's estimates over this year's appropriations	3,906,577 50

RECRUITING FOR THE ARMY.

In the act making appropriations for the support of the Army, approved June 16, 1874, $105,000 was allowed for recruiting purposes, and it was provided that "no money appropriated by this act shall be paid for recruiting the Army beyond the number of twenty-five thousand enlisted men, including Indian scouts." This prohibition fell in an unfortunate time and manner. The demands for the service of United States troops have been increased, and have been imperative for Indian and other service, ever since the adjournment of Congress; and serious consequences might easily have attended the manifest want of any considerable reliable force. There was no margin for emergencies, such as have arisen in connection with Indian affairs and the troubles in the South. I was opposed to the reduction at the time it was made, and have since had no reason to change the opinion then formed. The reduced appropriations for Army purposes have been too heavily taxed by the necessity of movement of troops; for, when obliged to be scattered at points on sudden emergencies, they have been moved from other points where their presence was needed, and had to be returned at the earliest possible moment. The reduction proposed and insisted on by Congress would, when it was accomplished, save alone the pay, subsistence, and clothing of five thousand men; but this amount cannot all be considered as having been saved, for when troops were needed at points where the force was found, in consequence of the reduction, to be too small for real service, other troops from other points were required to be transported at an expense almost large enough to equal in amount the saving from the sources named.

Besides, the number of posts was not reduced; the necessities of the service required that they should be garrisoned, and, although they were occupied by very small forces, yet the expense incident to the retention and operation of the posts existed to almost as great an extent as it would have done had the number on duty been larger. In my judgment, if a reduction of the Army is to be made, it can only be made by reducing the number of officers and men; in other words, by reducing the number of regiments. How that can be done in the present interests of the service, with the condition of affairs which requires the retention

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of the posts now in existence, and, indeed, the establishment of others, is a problem which must be determined if the reduction is insisted upon

As might have been expected, the loss by discharge and other casualties has fallen most heavily upon companies stationed in the disturbed districts, where effective strength is most needed. It may not be true economy to limit the President so strictly to fixed numbers of enlisted men in the Army. It may be better to empower him, in his sound discretion, to increase any companies to one hundred enlisted men. Ordinarily, then, the maximum would not exceed sixty-five or seventy; and when a sudden necessity arises detachments of recruits would be rapidly sent forward to the commands needing re-inforcements. Effective strength would thus be readily obtained, without increased expense on account of quarters, or of additional commissioned officers, as when organized companies have to be moved. It would be easy to maintain in a depot a limited body of well-drilled recruits, who would be effective the moment they joined their companies, and this would obviate very many of the objections existing to our present system.

I again commend to Congress the propriety of authorizing the enlistment of boys as field-musicians, as was formerly done. The arguments in favor of this measure are clearly laid down in previous reports.

Reflection as to the amount necessary to be appropriated for the ensuing fiscal year satisfies me that the appropriation for clothing, pay, and subsistence should be made for the Army upon a basis of 30,000 men. This would most certainly prevent any deficiency, and should appropriations to that extent be made, whatever surplus might remain on hand would be, under existing laws, turned into the Treasury.

QUARTERMASTER'S DEPARTMENT.

By the strictest economy, amounting almost to privation, and the cutting off of some of the allowances to which the troops were entitled by law and regulation, the expenditures for the Quartermaster's Department have been kept within the appropriations.

There are about 5,000 buildings under charge of the Quartermaster's Department to be kept in repair, to be renewed as they decay, or to be replaced by others in new positions when abandoned in the course of military movements. As long as the Army is in many localities badly sheltered, living in huts and adobe buildings sadly in need of repair, the roofs leaking, and the walls open to the inclement weather, I must repeat what I have so often insisted upon, that the appropriation for "barracks and quarters," out of which building-material is purchased, and the appropriation for "incidental expenses of the Quartermaster's Department," from which the expenses of the hire of labor is paid, are, as for some years they have been, entirely inadequate to the necessities of the service and the health and comfort of our troops. I call attention to these items again, in the hope, when the proper committee of Congress takes up the consideration of the appropriations for the

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Quartermaster's Department, that the amount estimated for the next fiscal year for this purpose may be appropriated in full.

A leading subject connected with the economy of the administration of this Department is the date upon which the fiscal year begins. The fiscal year now commences on the 1st day of July, as provided by the act approved August 26, 1842. An examination of the statutes fails to show that a fiscal year had even been by law formally established previous to that date, and it must be presumed that the estimates and appropriations were theretofore made for the calendar year, from January 1 to December 31.

The first recommendation for the passage of a law fixing the date upon which the fiscal year was to begin was that of the Secretary of the Treasury, in his annual report of December 4, 1834, in these words:

> It appears to the undersigned that a change in the commencement of the fiscal year, and of the time at which annual appropriations begin, would be a great improvement in the financial operations of the Government. If the year was to commence after the last day of March instead of September, and the annual appropriations begin the same date, many delays and embarrassments could be avoided, and the information on the condition of the receipts and expenditures of the previous year, to be laid before Congress each session, could be more full and accurate.

This recommendation was reiterated in two succeeding reports of Mr. Secretary Woodbury, in 1835 and 1836, but no detailed statement of the embarrassments and delays alluded to was made in any of his reports, nor did he demonstrate in what manner the change would effect an improvement in the financial operations of the Government. He dismissed the subject with the simple statement above quoted. Congress, however, gave no special attention to the matter until the year 1842, when Senator Evans, on June 23 of that year, introduced the bill, which is now the law, fixing the fiscal year to commence on the 1st of July in each year. It will be observed that the date recommended by Secretary Woodbury was April 1, and that adopted was July 1. A reference to the Congressional Globe discloses the fact that no extended debate was had upon the measure, and it passed, without being referred to a committee, upon the simple statement of Mr. Woodbury, then a Senator, "that the object of the bill was a desirable one—to make the fiscal year correspond with the commercial year." Thus the considerations which moved Congress to pass this important measure do not appear in the proceedings of that body, and particularly are we at a loss to discover the reason for establishing the 1st day of July in each year, instead of the 1st day of April, as recommended by Mr. Woodbury when Secretary of the Treasury, and also what was meant by him in stating that the fiscal year would then correspond with the commercial year.

Having thus endeavored to trace the course of legislation upon this subject, and, without avail, striven to discover the moving causes therefor, it now remains for me to illustrate the injurious effect resulting in the administration of this Department from this and subsequent enactments, and to venture to suggest a change.

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Appropriations being made for the service of the year, it becomes necessary to start into motion all the vast machinery required for the work intrusted to the Department. Large contracts must be made for transportation, subsistence, building, labor, and materials. The rigor of climate, in almost all parts of the country, confines the ability to perform outdoor labor with economy and success to the months between the last of April and the 1st of December. In other words, the working-season lasts but seven or eight months. The waters of the West and Northwest are closed to navigation from October until the spring rise. The Missouri River particularly is not navigable before May or after October. Large amounts of military freight are carried on these rivers. Building operations also are limited to the same period. It is, therefore, natural to suppose that, in a business point of view, all contracts for the purpose alluded to should be made to cover the whole working-season. But what is the effect of the legislation in regard to the fiscal year? A reference to recent legislation is peculiarly necessary.

The fifth section of the act approved July 12, 1870, (chapter 251,) provides "That all balances of appropriations contained in the annual appropriation bills and made specifically for the service of any fiscal year, and remaining unexpended at the expiration of such fiscal year, shall be applied only to the payment of expenses properly incurred during that year, or to the fulfillment of contracts properly made within that year." * * * * * * * *

The ending of one fiscal year and the beginning of another will be seen to occur nearly in the middle of the working year, dividing it in two.

The effect of this statute is to confine all contracts within the period of the fiscal year and no longer, and if continuous work or labor is required, or supplies to be furnished through the working-season, a new contract must be made, to commence July 1, thus breaking the working year in two without any reason or good result.

Again, the seventh section of the same act provides: "That it shall not be lawful for any Department of the Government to expend in any one fiscal year any sum in excess of appropriations made by Congress for that fiscal year, or to involve the Government in any contract for the future payment of money in excess of such appropriations."

This adds to the injurious effect of the fifth section already adverted to, because as the appropriations, at least in the long session, are not made till near its end, and as it is forbidden to make a new contract to cover the new fiscal year until an appropriation is made, the Department usually find itself in the awkward position of being a month or more without funds, in the very height of the working-season, and compelled to make two contracts where one would suffice, and discontinue work until its appropriation becomes available. Moreover, there appears to be no good reason why a disbursing officer, at a period when his business necessities require his utmost attention, should be compelled to turn in

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the balance of appropriations left on the 30th of June, to draw out the same money again on the 1st of July, going through all the formalities of a useless circumlocution.

In consideration of these facts, I beg to suggest that the passage of an act to fix the 1st day of May as the beginning of the fiscal year would relieve the Department from the embarrassments which in this connection it now experiences; would afford ample time for the perfection of the appropriation bills in Congress, and give the service the advantage of a full and uninterrupted season of work.

For the better care and protection of subsistence supplies, the last Congress authorized the selection from sergeants of the line of as many commissary-sergeants as the service might require, not to exceed one for each military post, and it is now recommended that a similar provision be made for the care of quartermasters' property by the passage of an act authorizing the selection of post-quartermaster sergeants. These sergeants would perform duties now undertaken by hired civilians, and would cost less to the Government than the latter, while at the same time the Government would derive all the advantage of their experience, as well as being able to control them by military authority and discipline.

Attention is called to the expediency of granting to the officers of the line detailed to act as assistant quartermasters, and to disburse money and be responsible for property, a monthly allowance, such as is paid to officers who act as assistant commissaries. The responsibility of many of these officers is greatly increased by such detail; they are exposed to loss from unfaithfulness of the men whom they are obliged to trust with property, and some compensation is due for this risk and responsibility The duties are important, and it should be made an object to the more intelligent young officers to seek them. At present officers knowing the risk and the labor involved, with no special recompense, too often avoid them.

The United States holds no public lands reserved for military sites in the State of Texas, hence the posts needed for the defense of the settlers against the savages have, in almost all cases, been located and constructed on lands which have, since their occupation by the troops, been entered by speculators in State lands.

The owners press for purchase, and only lease for heavy rents. The buildings erected to shelter the garrisons, though rude and temporary in character, have cost large sums of money, and they are liable to be lost to the United States for want of title to the sites. The act of 17th March, 1873, (17 Statutes, page 614,) was passed to provide a remedy for this state of things by purchase of suitable sites. Under its provisions a board of officers has examined into all the cases of importance. Its report was in accordance with the law transmitted to Congress on the 20th May, 1874, and printed in Ex. Doc. 230. An appropriation of $106,360 was asked for to settle these titles, but no action was had at the

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last session. It is very important that this appropriation be made at the earliest day, and that the United States be relieved from its present position of a trespasser on the private property of its citizens in Texas.

In general the railroad transportation for the Army has been satisfactorily performed, but complaints arise as to the conduct of some of the land-grant roads. Congress at its last session forbade any payment to be made to such roads for the transportation of property or troops, or of officers of the Army on duty. Previously these roads had been paid a portion of the cost of transportation, and as a consequence of the recent law some of them have very largely increased their rates of transportation for Government freight; others decline to make any collections on account of connecting roads which are not land-grant, while those not land grant decline to collect for those which are; others, while not declining to transport Government freight, refuse to load it on their cars, virtually leaving the quartermaster without means of shipment; and nearly all of them give private freight preference over Government freight, thereby delaying the shipments of the supplies for the Army. The effect of the legislation, then, seems to be, that while it saves to the Treasury direct disbursement of public funds, it indirectly, in present shipments, is the reverse of economical, and will add to the burden of claims which these roads will eventually press the Government to pay. A kindred annoyance lies in the operation of the same act in connection with the transportation of officers when traveling on duty. The act forbids any payment to such road in this class of cases; and officers must first find a quartermaster, from whom to obtain a certificate of transportation, and are compelled to go through an inspection as to their identity by the railroad conductor. Much complaint also exists as to the inequality of the allowance for actual traveling expenses only, as there are many expenses incident and necessary to a journey that cannot be re-imbursed. Long experience had demonstrated the wisdom and economy of the old laws and regulations upon this subject, which allowed the officer the choice of mileage or actual traveling expenses; and I recommend that that choice be restored by legislative enactment.

On the 30th June, 1873, there remained due and unpaid on account of principal, interest, and expenses of indebted railroads in the South and Southwest, $4,658,924.07. During the fiscal year interest has accrued and expenses have been incurred on these accounts to the amount of $98,479.77. Payments in cash and in transportation and postal earnings have been collected to the amount of $116,790.91. Under the act of 3d March, 1871, compromise has been made with certain roads whose debt was $2,699,470.60. These compromises were made as provided in the law, under the advice of counsel of the United States in the suits pending against the roads to recover the sums due by them. The sum to be paid at the office of the assistant treasurer of the United States in New York ultimately is $1,265,000. The total collec-

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tions on account of these sales have been, from the origin of the account, $5,240,423.84. Thirty-four roads have paid off their debt in full; sixteen still remain indebted to the United States.

The new uniform having been made and distributed to the Army has given general satisfaction with the exception of the plaited blouse.

The line of military telegraph from San Diego, Cal., to Prescott and Tucson, Ariz., provided for by the act of 1873, which appropriated, upon an estimate of this Department, $50,311.80 for its construction, was built by labor of troops, using the means of transportation of the Quartermaster's Department. The appropriation became available on the 1st of July; the line was completed and in operation on the 2d of December, 1873. The line is five hundred and forty miles long, and cost $45,000. The balance of the appropriation remains unexpended. As a surplus of wire remained unused on the completion of the line, it was used to extend the telegraph to Camp Verde. By this line, cheaply constructed, the principal posts in Arizona are placed in immediate communication with each other and with the headquarters of the Department of Arizona, of the Military Division of the Pacific, at San Francisco, and with the War Department.

The average cost of operation and maintenance has been $906 per month. The average revenue from private messages $757 per month. As the line will hereafter be operated by the Signal Corps, the cost of hiring civilian operators will be saved. An appropriation has been made since the opening of this line for its extension to Camp Verde, and the whole work has, by act of Congress, been transferred to the Signal Corps, which by its training is prepared to manage it.

The cost of the line has already been more than repaid in the saving of expense and loss in the pursuit of savages who have broken out from the reservations and committed depredations. Messages from all points are retransmitted to order and organize the movements of pursuit, and the cost of couriers has been much diminished.

Under the act appropriating a million of dollars for placing headstones at the graves of soldiers interred in the national military cemeteries contracts have been made for the whole work, which are within the sum appropriated, and the same is now in progress.

There are 76 cemeteries designated as national, in which are interred 139,962 unknown and 162,079 known soldiers. Sixty-eight superintendents are on duty.

The cemetery established at the city of Mexico during the Mexican war having been declared a national military cemetery by act of Congress, and committed to the care of this Department, improvements have been made; its walls, walks, and drains have been put in good order, its lodge extended and improved, and an artesian well has been sunk to supply it with water for irrigation necessary in that climate.

Reports of the graves of soldiers who died during the war and were buried in solitary places continue to come in. All such are removed to

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the final resting-places provided by the country in the nearest national military cemetery.

It is probable that the head-stones will be put up in all the national cemeteries during the coming year. I deem it very desirable that the permanent improvements at these cemeteries should also be completed as soon as practicable.

These improvements consist of—

First: Durable inclosing walls at the following-named places, viz:

1. Alexandria, La.; 2. Andersonville, Ga.; 3. Baton Rouge, La.; 4. Beaufort, S. C.; 5. Brownsville, Texas; 6. Florence, S. C.; 7. Fort Gibson, Indian Ter.; 8. Fort McPherson, Nebr.; 9. Glendale, Va.; 10. Grafton, W. Va.; 11. Poplar Grove, Va.; 12. Seven Pines, Va.; 13. Wilmington, N. C.; 14. Yorktown, Va.

The cost of these walls is estimated at the sum of $129,000.

Second: Superintendents' lodges at the following-named cemeteries, viz:

1. Alexandria, La.; 2. Baton Rouge, La.; 3. Beverly, N. J.; 4. Camp Nelson, Ky.; 5. Fort Gibson, Indian Ter.; 6. Fort Donelson, Tenn.; 7. Fort McPherson, Nebr.; 8. Grafton, W. Va.; 9. Lebanon, Ky.; 10. Logan's Cross-Roads, Ky.; 11. Pittsburgh Landing, Tenn.; 12. Chalmette, La.

The cost of these lodges is estimated at the sum of $56,000, making a total of $185,000 which I recommend to be made as "a permanent or indefinite" appropriation, in order that the work may be prosecuted to the best advantage to the public service.

SUBSISTENCE DEPARTMENT.

I invite attention to the recommendations of the Commissary-General in regard to the selection of enlisted men as commissary-sergeants; the sale of subsistence stores to officers; the exemption of subsistence supplies from the operation of the act requiring the proceeds of sales to be covered into the Treasury, and the necessity for making a large part of the appropriations for subsistence available prior to the first day of the fiscal year, in order to take advantage of the opening of the shipping season. The law now authorizes the selection of commissary-sergeants from non-commissioned officers only; but no good reason is perceived for not taking advantage of the skill and experience of private soldiers, and it is therefore recommended that they also be made eligible to promotion to the grade referred to.

I have several times adverted to the requirements of the act of May 8, 1872, that all proceeds of sales of public property must be covered into the Treasury as miscellaneous receipts. This law operates with peculiar detriment to the Subsistence Department. Subsistence supplies, as is well known, are extremely perishable, and in case of their damage or decay must be either thrown away or sold. If sold, the money cannot be used to procure new supplies in their stead, but must

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go into the Treasury and become unavailable. This is also the case when sales are made when posts are abandoned; when made to employés, to starving Indians or emigrants, or to railroad and land surveying parties; and the effect is that the subsistence appropriation is diminished by precisely the amount of these sales. Necessity requiring new purchases in their stead to meet the wants of the Army, the Department finds itself with an appropriation proportionately inadequate. It is plain that, could the money derived from new sales be applied to new purchases, no increase of appropriation would be made, but only the original amount given by Congress be used. For these reasons I concur in the recommendation of the Commissary-General that so much of section 5 of the act of May 8, 1872, as applies to any property, funds, or appropriation under the control of the Subsistence Department be repealed. In regard to the necessity of authorizing a part of the appropriation for subsistence to be expended prior to the beginning of the fiscal year, I refer to the views given in another part of this report respecting a change of the date upon which the fiscal year should commence. A general enactment making the change would of course meet the necessities of this particular case.

By the act entitled "An act to provide for the relief of the persons suffering from the overflow of the Mississippi River," approved April 23, 1874, and the acts supplementary thereto, approved May 13, 1874, and June 23, 1874, and the joint resolution approved May 28, 1874, extending the provisions of those acts to the sufferers from overflow on the Tombigbee, Warrior, and Alabama Rivers, appropriations were made amounting in the aggregate to $590,000. In compliance with the requirements of the laws making these appropriations, issues of food to the sufferers from overflow on the rivers named were discontinued on the 1st day of September, 1874. The report of Capt. Thomas C. Sullivan, commissary of subsistence, United States Army, the officer charged with the duty of purchasing and distributing the food, will be transmitted as soon as prepared.

PAYMASTER-GENERAL'S REPORT.

I call the attention of Congress to the recommendations of the Paymaster-General, as to the increase of the force of his department. The reasons therefor are stated in full in his report. I feel it my duty to express the fear that the scheme of paying the trops by checks, which has been suggested, would not result advantageously. The letter of the Paymaster-General, of 25th March, 1874, contains in full the objections to that proposition.

MEDICAL DEPARTMENT.

Notwithstanding the occurrence of a few cases of yellow fever at Forts Jefferson and Barrancas during the summer of 1873, the Army enjoyed unusual good health during the year.

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During the summer of 1873 yellow fever appeared as an epidemic at various cities in the Southern States, assuming at some points a most malignant type, and proving exceedingly fatal, as for example at Memphis, Tenn., and at Shreveport, La. That it did not prevail to a greater extent in the Army must be regarded as being due to the hygienic precautions adopted, and especially to the prompt removal of the troops from those posts at which the disease was introduced from infected localities, or at which its introduction appeared to be imminent.

The data for the descriptive anatomical catalogue have been perfected. The publication of this work, recommended by the Secretary of War and by the House of Representatives, was not acted upon by the Senate. The materials are so arranged that the work can be speedily completed when authority to print is granted, and I would respectfully renew the recommendation made in my previous annual reports, that authority be given to publish one thousand copies of the work.

Legislation is necessary to authorize the Congressional Printer to publish an additional edition of 5,000 complete copies of the Medical and Surgical History of the War, and this I recommend.

In accordance with the joint resolution of Congress, approved March 25, 1874, Assistant Surgeon Ely McClellan, United States Army, was detailed to inquire into and report upon the causes of epidemic cholera, and was instructed to visit the towns and localities in the United States at which cholera prevailed during the year 1873. His report is now in course of preparation.

In the re-organization of the force of the Surgeon-General's Office, by the last legislative appropriation act, no provision was made for the continued employment of the chemist and his assistant. Work has, therefore, had to be suspended in the laboratory, thus depriving the Department of the protection and advantage of careful and reliable analysis of drugs and medicines, and making it impossible to furnish, as heretofore, other Departments of the Government with results of examinations for detection of adulterations or establishment of values for guidance in selection and purchase.

The act organizing the staff corps of the Army, approved June 23, 1874, while allowing appointments of assistant surgeons in the Army, cuts off two of the five lieutenant-colonels and ten of the sixty majors in the Medical Department, thus preventing any promotion for several years to come. This places the officers of the Medical Corps below those of all the other staff corps and of the line of the Army as regards promotion, which is felt by them as a hardship and injustice, the results of which cannot fail to be injurious to the best interests of the service.

The clause of the same act which specifies that "the number of contract-surgeons shall be limited to seventy-five, and thereafter no more shall be employed," must result either in actual suffering for want of medical attendance or in largely increased expense to the Government. The number of candidates presenting themselves before the examining boards for the position of assistant surgeon is not large, and probably

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not more than twenty-five will pass the examination by the 1st of January, to take the place of over one hundred contract-surgeons to be discharged under the above law. The only resource will be to employ local physicians, without contracts, and pay them the ordinary fees of private physicians, which past experience has shown will cost much more and be less satisfactory than the present system.

At date of last report there existed sixty-four vacancies in the Medical Corps, viz: two assistant medical purveyors, five surgeons, fifty-six assistant surgeons, and one medical store-keeper.

During the past year three surgeons and one surgeon (retired) have died, and one surgeon has resigned; the vacancies in the grade of assistant medical purveyor, surgeon, and medical store-keeper, were abolished by act of Congress approved June 23, 1874, leaving at present fifty-six vacancies in the grade of assistant surgeon.

ENGINEER DEPARTMENT.

Under the Chief of Engineers the works for the defense of the coast have been prosecuted with vigor and as rapidly as the appropriations in hand would permit, and in several of our important harbors some of the larger works are approaching completion. Generally, the works are modifications of existing defenses, constructed for less powerful armaments than those now used. The rapid advances that have been made in power of modern ordnance, renders it essential that these works should be pushed forward to completion and properly armed.

The Battalion of Engineers, in its construction, drill, and efficiency for service, has been kept to the high standard requisite for this arm of service. Stationed at Willet's Point and West Point, they have principally been employed in the trials and developments of our torpedo system, and in the instruction of cadets, while small detachments have assisted the officers engaged in western explorations. The appropriations asked for its service are recommended to Congress.

The trials with torpedoes, which for some years past have been going on at Willet's Point, have developed a system inferior, it is believed, to none in use abroad, which will furnish us at small cost with a means of barring our harbors against the inroads of iron-clad vessels, furnishing us with one form of obstruction for holding them under the fire of our guns. The importance of this class of defenses is so obvious that the necessity for making the appropriations asked for the collection of such materials as cannot be obtained speedily need not be urged upon Congress.

Satisfactory progress has been made upon the works for the improvement of rivers and harbors, and the surveys and examinations connected therewith, in accordance with the provisions of the river and harbor appropriation act approved March 17, 1873.

The report upon the practicability of bridging, consistently with the interests of navigation, the channel between Lake Huron and Lake Erie, required by the third section of this act, was submitted during the

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ast session of Congress, and printed, forming Executive Document No. 64, House of Representatives, Forty-third Congress, first session.

The provisions of the second and third sections of the act approved May 11, 1874, "providing for the payment of the bonds of the Louisville and Portland Canal Company," so far as relates to the transfer of all the property of said company to the United States, have been complied with. This transfer of the canal was made on the 10th day of June, 1874, from which date the reduction of tolls took effect. The requirements of the act regarding the rate of tolls for the year 1875 will be complied with as soon after the close of the present calendar year as practicable, when a special report will be submitted setting forth the receipts and expenditures during the period of reduced tolls, *i. e.*, from June 10 to December 31, 1874, and the condition of the canal at the close of the year.

In compliance with the provisions of the act approved June 22, 1874, authorizing the construction of a substantial iron and masonry bridge and of a causeway across the Anacostia, or Eastern Branch of the Potomac River, at or near the site of the present Navy-Yard bridge, a contract has been entered into with responsible parties for the construction and completion of the said bridge.

An act approved June 22, 1874, provided for the appointment of a commission of engineers to investigate a permanent plan for the reclamation of the alluvial basin of the Mississippi River subject to inundation. The commission has been organized, and the members are now engaged upon the investigation and collection of the data necessary to the preparation of a full report.

The amounts appropriated by the river and harbor act of June 23, 1874, are applied to the specific objects therein designated. Detailed information in regard to the condition of each work of improvement, and the progress made in the surveys provided for in the act, may be found in the report of the Chief of Engineers.

The surveys upon which to base estimates for the improvements recommended by the Senate Select Committee on Transportation Routes to the Seaboard, including that for the extension of the Chesapeake and Ohio Canal, are now in progress.

The board of engineers provided for in the third section of the act has been organized, and the members are now engaged upon the investigations, examinations, and surveys necessary to the preparation of a report upon the best method of obtaining and maintaining a depth of water sufficient for commercial and military purposes, either by canal from the Mississippi River to the waters of the Gulf of Mexico or by deepening one or more of the natural outlets of the river.

The survey of the lakes has been carried on during the year with its accustomed energy and success. The connection of the triangulation of Lakes Superior and Michigan, the in-shore and off-shore hydrography and topography, have been finished; the Wisconsin triangulation has

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been carried southward to the vicinity of Chicago, and the Keweenaw base has been measured. The surveys of the Detroit River and river Saint Lawrence from the forty-fifth parallel have been completed, and a map of the lower half of the former has been published; the determination of several points in the interior of Michigan has been made in aid of surveys by the State; the survey of Lake Ontario has been commenced, and much of the field-work has been reduced. The preparation of Chart No. 1 of the Saint Lawrence, of Sandusky Harbor, and of the mouth of the Detroit River, has been completed, and they are now in the hands of the engravers. The need of the vigorous prosecution of this important survey is shown by the number of copies of the various finished charts called for now, from five to six thousand copies a year, and by the constant demand for charts not yet completed. It has been stated that a single survey made last year, viz, the survey of the mouth of the Detroit River, will save from $50,000 to $100,000 to commerce this year.

The labors of the party engaged on the geological exploration of the fortieth parallel have been mainly directed during the last year to the preparation of the report and accompanying illustrations. The topographical maps, all of which have been completed, have been put into the hands of an engraver, and the preliminary work for the report, consisting of chemical, paleontological, and microscopic studies, has been carried on with success.

Microscopic researches are also being made with a promise of identifying American rocks with well-known types in Europe. It is confidently expected that the reports of this important survey will be brought to a close within the present fiscal year.

The geographical surveys and explorations west of the one hundredth meridian in California, Nevada, Utah, Arizona, Colorado, New Mexico, Wyoming, and Montana, have been carried on successfully since my last report. At the commencement of the fiscal year the three main parties engaged in this work had left their rendezvous at Salt Lake, Utah, Denver, Colorado, and Santa Fé, New Mexico. They moved south into Arizona, connecting with the work of former years, and covering during the surveying season about 75,000 square miles of territory. In addition to its topographical work proper, the survey embraced the fixing of many points astronomically, and investigations in geology, mineralogy, natural history, and the natural resources of the country traversed. It is expected that a large part of the results of this survey will be ready for the press during the coming year.

The officers of the Corps of Engineers who have been attached to the headquarters of the military divisions and departments into which the United States is divided have been engaged during the past year in reconnaissances and explorations, in the collection of geographical and topographical information required by their commanding generals and for the compilation of the map engraved and distributed by the Engineer

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Department. Facilities have been furnished through these officers to most of the interior posts for the plotting of the routes of scouting and other military journeys, and an increased interest appears to have been taken by the officers and men in adding to our present knowledge of the interior of the continent, as is evidenced by the fact that in one of the departments—the Department of Missouri—23,000 miles have been covered by the military journals and sketches during the last year, while in the preceding year there were but 9,000 miles recorded in the department. Among the more important results during the last year may be mentioned the discovery of a new wagon-route from the line of the Union Pacific Railway to the Yellowstone Park and Montana; a reconnaissance in the country of the Ute tribe of Indians; the construction of a wagon-road from Santa Fé to Taos, New Mexico, and a survey of the Black Hills of Dakota by the engineer officer attached to the military expedition which was sent into that interesting country during the summer of 1874.

The commission of two engineer officers and one coast-survey officer, organized under the act of Congress approved March 3, 1873, for the purpose of examining and reporting upon a system of irrigation of the San Joaquin, Tulare, and Sacramento Valleys, have completed their investigations and have made their report, the principal points of which are referred to in the report of the Chief of Engineers.

The estimates of the Chief of Engineers are submitted separately, as presented by that officer, viz:

Fortifications and other works of defense	$2,108,700
Public buildings and grounds, and Washington aqueduct	678,410 50
Surveys	399,000 00
Engineer depot at Willet's Point, New York	9,000 00
Office expenses	35,000 00
Improvement of rivers and harbors	12,970,500 00
Total	16,200,630 50

ORDNANCE DEPARTMENT.

At the different arsenals, the operations during the year have been chiefly the erection of public buildings at the Benicia and Rock Island Arsenals, under specific appropriations; the care and preservation of the different arsenals, and of the ordnance and ordnance stores thereat; the manufacture of small-arms, ammunition, and other ordnance stores and supplies; the preparation of experimental cannon, and the supplying the Regular Army, the Marine Corps, and the whole body of the militia with arms, ammunition, and materials.

The adoption of the Springfield breech-loading system by a board of officers convened under congressional enactment, and its subsequent establishment by law as the only system to be used in the manufacture of arms, enables the Department to continue the manufacture upon a secure basis, and provide an arm with no superior, that may probably

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not be superseded by any more perfect invention for many years to come.

The production of rifles and carbines upon the adopted plan has been pushed forward at the National Armory with energy and success, and the new arms issued to the troops will no doubt give great satisfaction. Their issue has been retarded by the lack of ammunition, the small appropriation not supplying the number of cartridges per man deemed indispensable by the commanding generals of departments.

That the troops might be trained to more accurate firing, orders have been issued by the Department authorizing the annual issue of 120 ball-cartridges per man, being ten per month for each man. This certainly does not appear to be too much, but when a calculation is made of the number and the cost, it is found that this limited issue will require 3,000,000 cartridges, which would absorb the whole of the appropriation of $75,000 for the manufacture of metallic ammunition for the fiscal year. It is evident, therefore, that a larger appropriation for this purpose should be made, and I trust the matter will receive the favorable consideration of Congress.

The appropriation of $100,000 made by Congress at its last session for the manufacture of arms, had to be supplemented from the permanent appropriation for "arming and equipping the militia," in order to work economically, to keep the cost of the arms within proper limits, and enable the Department to supply the wants of the Army and militia. Not less than half a million of dollars should be annually expended at the National Armory, not only as a measure of economy in producing the best arm for the least money, but in the interest of the country to make a gradual but sure accumulation of the best weapons as a reserve in case of war. In again urging this important matter upon the attention of Congress, I am actuated solely by a sense of public duty, and an earnest desire to have the nation brought to a keen realization of the necessities of the country and the gravity of the subject, and do not hesitate to express my decided conviction that a liberal expenditure at present will prove to be the greatest economy in the future. Every nation that aspires to the dignity of a first-class power has cast aside its obsolete muzzle-loading arms, and at immense cost has been and is providing the newest and most approved models by hundreds of thousands. The sudden occurrences that end in war, and the startling rapidity with which wars are waged and terminated, demand complete preparation in time of peace. With us the want of a large standing army can only be compensated by keeping on hand, ready for any emergency, a complete supply of every description of war material. Arms and ammunition are of the first importance when an army is to be improvised, and the country should place its dependence at such a juncture on the reserve supplies stored in its arsenals. Certainly not less than half a million of the best arms should be manufactured as rapidly as the monetary condition of the

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country will permit. The experience of the past is the surest and safest guide in making preparation for the future.

An increase in the annual appropriation for arming and equipping the whole body of the militia is again brought to the attention of Congress, with the hope of some legislation thereon. Not only should the appropriation be largely increased to meet the wants of our ever-growing population, but some legislative action should be taken to relieve many of the States and Territories from charges for arms issued to them during the rebellion, and which should not in fairness have been so charged. This subject has been so often referred to in previous reports, and so largely dwelt upon, that a more extended reference to it at this time is deemed unnecessary.

In October, 1873, consideration was given to the necessity of changes that should be made in the horse-equipments, accouterments, tools, and materials for cavalry service in the field, and the determination of a standard table of supply. A board of calvary officers was appointed, to give the Department the benefit of its knowledge and experience. Its report is appended to that of the Chief of Ordnance.

The recommendations, when executed, will undoubtedly add greatly to the efficiency of the cavalry service, and every detail will be carefully carried out as fast as funds will permit, and with due regard to the utilization of the stock on hand.

For several years past I have directed attention to the large number of arsenals east of the Mississippi River scattered through the country, the consequent lack of concentration of work in the interest of economy and perfection of product, and the undoubted necessity of disposing of several of these national establishments, and the building up of a grand arsenal on the Atlantic seaboard. In order to facilitate intelligent action on the subject, by the collection of all necessary data for the information of the Department and of Congress, a board of ordnance officers was appointed some months since, to make a comprehensive and exhaustive study of the subject, and also of the question of a proper location for a powder-depot and of an experimental ground for the testing of heavy ordnance. After several months of patient and careful investigation the board has made its report, which is herewith transmitted. It strongly recommends the retention of the Springfield Armory and the Frankford Arsenal, and the establishment of a grand arsenal in the vicinity of New York City for manufacturing purposes; retaining also the Indianapolis Arsenal, Indiana; Kennebec Arsenal, Maine; Fortress Monroe Arsenal, Virginia, and Augusta Arsenal, Georgia, as places for storage and repair. It recommends the sale of the Allegheny, Columbus, Detroit, Pikesville, Watervliet, Watertown, and Washington Arsenals, the sales to be made as rapidly as circumstances may permit, the proceeds to be devoted to the purchase of a site and the erection of buildings for the grand arsenal. I heartily concur in these recommendations, and invoke favorable consid

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eration on the part of Congress. Some such definite policy must be inaugurated and steadily pursued. That such establishments demand the fostering care of the country calls for no argument, and that the number of our arsenals must be reduced seems to be the conclusion reached by Congress in the past two years, judging from the very small appropriations made for their care and preservation—appropriations not sufficient to keep the buildings from running to decay. These seemingly large reductions by sale will, when accomplished, leave thirteen arsenals and the armory; a number amply sufficient, when liberally sustained, to meet all the demands of the nation, and all this can be effected from the sales of arsenals, and without the expenditure of a single dollar out of the national Treasury.

The establishment of a powder-depot and an experimental ground for heavy cannon are also discussed by the board, and its recommendations are approved. An estimate for these very important and desirable objects has been made, which it is earnestly urged that Congress take favorable action upon. The great-gun problem cannot be solved without continued experiments, considerable expenditure, and all the facilities of a well-appointed experimental and proving ground. The improvements in modern gunnery are as much the result of the hourly demonstrations on the experimental ground as in the success of mechanical manipulation and skill in the workshop, and certainly no exercise of theoretical knowledge and research will avail without the tests of experimental proof.

Much legislation affecting the Ordnance Department, originating in the earlier days of the Republic, and which had in the course of years fallen into disuse, has been revived and incorporated in the Revised Statutes of the United States. Some of it, in matter of detail, is mandatory in its language, and, being interwoven with more recent legislation, based on the constantly-changing exigencies of service, renders the execution of the letter of the law incompatible with the best interests of the service.

It is not presumed that Congress intended to revive what may be considered obsolete details, but such is the effect of some of the enactments in the Revised Statutes, and I would therefore suggest that, as far as it affects the Ordnance Department, the subject receive the attention of Congress.

BUREAU OF MILITARY JUSTICE.

At the last session of Congress a bill to confer jurisdiction upon military tribunals over military persons charged with murder or other felonies was submitted to Congress. It passed the House, but failed in the Senate. In the case which was the immediate inducement of that application for legislation a soldier had gone to the camp of Indians living on a Government reservation in California, and had there wantonly shot dead one of them as he lay asleep in his tent. The Bureau

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of Military Justice decided that a court-martial had no jurisdiction, and earnest applications to the civil authorities of the proper county failed to secure the indictment of the murderer. A recurrence of a like crime under similar circumstances, with the same impunity, might at some time, by provoking natural retaliation, involve the Government in a costly and unnecessary war.

It seems to me that some remedial law could be devised containing such safeguards for subordination to civil authority as would relieve the public mind of the jealousy of military power, which is apparently the obstacle to an enlargement of the jurisdiction of military tribunals. As courts-martial have now the power to impose the death penalty for the military crime of a soldier striking his superior officer while in the execution of his office, why should they not be authorized to impose such a punishment for the murder of a comrade, or a defenseless Indian, or a frontiersman?

SIGNAL-OFFICE.

The regular instruction in military signaling and telegraphy, meteorology, and the signal-service duties at stations of observation, together with the drills of the signal soldiers with arms, has continued at the school of instruction and practice at Fort Whipple, Virginia. The course of instruction and practice is intended to furnish a force of selected enlisted men at once disciplined as soldiers, and fitted by special instruction for the different duties of the signal-service. Working-parties have been organized at the last named for the construction of the telegraphic lines of the sea-coast service and on the frontier.

The act approved June 16, 1874, maintaining the signal-service at a force providing for 150 sergeants and 30 corporals, and privates in the proportion of two for each sergeant, has been productive of good results. The men who have enlisted under it are of superior quality.

During the year 23 stations of observation have been added to those from which reports are deemed necessary to enable proper warnings to be given of the approach and force of storms and of other meteoric changes for the benefit of agricultural and commercial interests.

The daily exchange of telegraphic reports with the Dominion of Canada has been maintained, and warnings of threatened danger have been regularly sent, to be displayed at the ports of the Dominion.

A series of daily telegraphic reports has been received from stations in the West Indies, extending from Cuba, by Jamaica, to Barbadoes and the Windward Islands. The most eastern station thus established, and in the course of possible cyclones, lies 2,300 miles to the southward and eastward of Washington.

The issue of the official deductions had at the office of the Signal-Officer from the reports there received has continued during the year.

A minute examination of these deductions, and a comparison with the meteoric changes afterward occurring within the time and within the district to which each has had reference, has given the average per-

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centage of eighty-four and four-tenths as verified. With a more scrutinizing form of analysis the percentages have improved upon those of the preceding year. The wide diffusion given these reports may be judged from the fact that they appear daily in almost every newspaper published in the United States.

The display of cautionary day and night signals upon the lakes, and at the great ports of the United States, upon the Atlantic and Gulf coasts, has been made systematically on occasions of supposed especial danger at forty-two different stations, sea and lake ports, and cities. Of the total number of cautionary signals thus displayed 75 per cent. have been afterward reported as justified. In no case has any great storm swept over the ports of the United States without pre-announcement.

By an arrangement with the Post-Office Department 6,286 printed "farmers' bulletins," on which appear the daily reports of the Signal-Office, have been distributed and displayed in frames, daily, at as many different post-offices in different cities, villages, and hamlets, in different States, for the use of the agricultural population of the country, and they have been so displayed on an average within ten hours from the time they have left the Signal-Office in Washington.

The river-reports, giving the average depth of water in the different great rivers of the interior, and notice of dangerous changes for the benefit of river commerce and the population in the vicinity, have been regularly made, telegraphed, bulletined in frames, and published by the press at the different river ports and cities, and in cases of great floods, special river-reports have been issued.

By the great diffusion given the reports of this office through the press, the display of the different office-bulletins and forms of report, the maps and regular publications, it is estimated that the statements based upon the information gathered upon the files of the office and issued for the public use reach daily at least one-third of all the households in the United States.

The publications of the office, the Weekly Weather Chronicle and the Monthly Weather Review, have been regularly issued during the year. A number of valuable charts have been prepared. A single altas condenses into twelve charts results as to the average courses of movement of areas of disturbance in the United States, derived from the studies of the three thousand three hundred and seventy-five charts, charted at the Signal-Office in the period from March, 1871, to April, 1874.

As in the preceding years, a very considerable number of observations have, at the request of the Department, been taken on vessels at sea to complement the synchronous reports of the service and forwarded. Their utility is evident in the study of storms approaching our coasts, or which endanger vessels sailing from our ports.

At the congress of persons charged with meteorological duties, assembled at Vienna in 1873, a proposition to the effect that it is desirable, with a view to their exchange, that at least one uniform observation of

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such character as to be suitable for the preparation of synoptic charts be taken and recorded daily and simultaneously throughout the world, was adopted.

Special correspondence had by the Signal-Officer, by authority of the Department, with scientists and chiefs of meteorological services representing the different countries, has resulted in arrangements by which a record of observations to be taken daily, simultaneously with the observations taken throughout the United States and the adjacent islands, is exchanged semi-monthly. These reports are to cover the territorial extent of Algiers, Austria, Belgium, Great Britain, Denmark, France, Germany, Italy, the Netherlands, Portugal, Russia in Europe and Asia, Sweden and Norway, Spain, Switzerland, and Turkey. Requests for similar co-operation are proffered to other nations as rapidly as practicable. The results had from this report are considered of especial importance, combining a co-operation thus already extending around the northern hemisphere, to aid in the solution of questions upon which the United States has entered, and preparing for an exchange of telegraphic reports when that may be deemed advisable. Thus it has been left to the youngest nation to organize and in a great measure perfect a system of weather observations and meteorological studies which will soon encircle half the globe.

The sea-coast service of the signal corps, in connection with the life-saving service, has been continued during the year. Telegraphic lines reaching from Barnegat to Cape May and from Norfolk to Cape Hatteras have been constructed, the stations upon them occupied, and the telegraphic lines operated by the officers and enlisted men of the signal-service. The telegraphic wires connect each station directly with the War Department.

In pursuance of the acts of Congress approved June 3, 1874, and June 23, 1874, authorizing the construction and operation of telegraphic lines in the interior and upon the frontier, connecting military posts, and for the protection of the population from Indian and other depredations, the construction and operation of the lines has been placed in charge of the signal-service.

The lines in Arizona, already partly constructed, are in process of completion. Arrangements have been made to man the stations already established with enlisted operators. The work upon the lines upon the Texan frontier has been more difficult. Active operations have been commenced upon the section extending from Denison to Forts Sill and Richardson. The detachments serving upon these lines are armed for their own defense and the defense of the works.

These lines are to be constructed and operated by the labor of enlisted men. The use of such lines is recommended as a measure of economy for the Army; permitting the scattered forces upon the frontier to be immediately informed of the incursions of Indians or of depredatory bands, and to be moved with intelligent rapidity, and from different points, in pursuit.

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The Chief Signal-Officer earnestly recommends a more permanent organization of the signal-service, as necessary now both for the interests of the United States and as simple justice to the officers and men who have served so long and faithfully upon it.

The Department has to acknowledge a cordial and wide-spread cooperation at home and abroad. The systems of observation intrusted to its care by those hitherto charged with them evidence the belief that there will be an effort, at least, to use them wisely. It labors now in a work to which none of the great family of nations are strangers. The uses of the work accomplished, the magnitude of that in the future, have been well appreciated by scientists. There has been wanting neither acknowledgment of services already rendered nor incentive to future effort.

The popular support so long and generously given has been continued. Criticism has been temperate, and willing to be easily satisfied. Legislation has been favorable. To aids like these the advance of the work has been due. There seems no difficulty to be encountered in the future greater than has been already met in the past. The opportunities for rendering a public good have widened as the service has extended.

INSPECTOR-GENERAL'S DEPARTMENT.

Scrutinizing examinations have, in compliance with law, been made of the accounts of disbursing-officers. The necessity, economy, and propriety of the expenditures and their conformity to the laws appropriating the money have been made subjects of special investigation. The funds received and expended, with the balances reported due the United States, have been verified by official statements from the Treasury Department and depositories, and it is gratifying to state that, since the existing inspection system has been put in operation, but three cases of deficiencies or irregularities in the application of funds have occurred, two of which have already been made good to the United States, and it is probable no loss will ultimately result from the other.

Although the ratio of deserters from our Army has materially diminished during the past year, yet the number still continues so great as to make this one of the most serious and perplexing evils we have to encounter in our service, and a remedy is much needed.

I agree with the Inspector-General of the Army in his suggestion *that desertion be constituted, by legislative enactment, as a felony, cognizable by our civil courts of criminal jurisdiction, the offenders to be arrested by marshals and deputies, like other criminals; but this jurisdiction to be concurrent with that of military courts.*

MILITARY REPORTS.

The report of the General of the Army and of the Division and Department commanders are herewith forwarded. They speak for them-

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selves as to the immense amount of work so promptly so thoroughly and so gallantly done by the officers and men of the Army. Its discipline has been maintained, and the most laborious duties have been performed to the satisfaction of the country. Some of these reports call attention to the fact that many officers and men have been commended in previous reports for gallantry and good conduct. These officers were recommended for brevets during the previous session of Congress, and their names were accordingly sent to the Senate by the President. The energy exhibited and the gallantry shown by those heretofore named makes it proper for me to call attention again to the subject, and to recommend that action be taken thereon.

I agree with the commander of the Department of the Platte, that the pay of sergeants should be increased, and recommend that his suggestion in this direction be carried out.

DISMISSAL OF ARMY OFFICERS.

In my judgment the necessity exists for the passage by Congress of a law authorizing the President to drop summarily from the rolls of the Army any officer who has been detected in presenting duplicate vouchers for pay. It is true that this illegal and criminal act is not frequent, but I regret to say that it does occur occasionally, and the offenders have been dismissed from the Army by sentence of court-martial. But it seems to me that even the short delay which arises from the time necessary to convene a court should not be permitted to exist in cases of this kind. It is a crime which, if the duplicate accounts are presented, admits of no doubt; the papers themselves form sufficient testimony. The existence of a court could be avoided, and short, sharp, and decisive action should be taken in the cases of those who are guilty of this grave offense.

LEAVE OF ABSENCE TO ARMY OFFICERS.

On the 8th May, 1874, Congress passed an act providing "that the officers on duty at any point west of a line drawn north and south from Omaha City, and north of a line drawn east and west upon the southern boundary of Arizona, shall be allowed sixty days' leave of absence, without reduction of pay or allowances," under certain provisos therein stated. It is very desirable that the provisions of this act be extended to embrace the Department of Texas; and I recommend to Congress the necessary legislation to accomplish the end in view.

My opinion, expressed in previous reports, has not changed concerning the advisability of discontinuing, as vacancies occur in these grades, the extra lieutenants now authorized by law to serve as regimental quartermasters and adjutants. As a measure of economy it commends itself to the attention of Congress.

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PROVISIONS FOR THE SUPPORT OF WIDOWS AND ORPHANS OF ARMY OFFICERS.

Much interest has been taken by many officers of the Army in the passage by Congress of an act providing that equitable deductions should be made from the monthly pay of officers and deposited to the credit of the Treasury of the United States, to be passed into the general balances of the Treasury and be known as the "Army mutual survivorship annuity fund." A bill for the protection of widows and orphans of officers of the Army, upon a plan which had been thoroughly matured, was introduced into the House of Representatives at the last session of Congress, and referred to the Military Committee, in whose possession it now is. The views of those eminently qualified to judge of the subject of life-insurance have been taken, and they are without exception favorable to this plan. There are many strong reasons why I should recommend it, as I most cordially do, to the favorable consideration of Congress.

MILITARY PRISON.

In accordance with the requirements of the law concerning a military prison, I made a personal inspection, in the month of October, of the location therefor at Fort Leavenworth, designated by the act. A suitable and proper site has been selected for the location of a permanent building, should an appropriation therefor be made by Congress. The buildings referred to in that act, in which quarters were to be made for the accommodation of the prison temporarily, were examined by myself in company with the department commander, and I am satisfied that they can be rendered properly secure for the intended temporary purpose. The establishment of this prison will result in great economy of expenditure, and the valuable results to arise from an institution of the character named cannot be overestimated. It is my purpose hereafter to submit to Congress estimates for the erection of permanent buildings on the site selected.

MILITARY ACADEMY.

My annual visit to West Point last June was unexpectedly terminated before the graduation of the first class; but it was sufficiently lengthy to satisfy me that, during the previous year, the Corps of Cadets had steadily improved in discipline, and the result of the annual examinations has shown a perceptible increase of proficiency in scholarship.

The academic regulations prepared last year have been stringently enforced since their promulgation, (October 1, 1873,) and have been sufficiently tested to establish their improvement over the old regulations.

Of the 342 cadets allowed by law, 297 are now at the academy, and every exertion is being made to induce the congressional Representatives in whose districts the vacancies exist to nominate capable candidates at a sufficiently early day to insure their admission next June.

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The failure of a large percentage of the candidates each year nominated for cadetships is unquestionably owing to the short time they have for preparation, in consequence of the failure of members of Congress to select candidates at the time when requested to do so by the Department. If greater attention were given to such invitations, the appointees would have more time for preparation, and, consequently, would be more likely to pass the academic examination.

It is also believed that if the parents of those nominated, or the candidates themselves, would more generally comply with the suggestion of the Department, always offered in the case of each appointee, that before leaving his place of residence for West Point he should be thoroughly examined by a competent physician, and by a teacher or instructor in good standing, such an examination would reveal any *serious* physical disqualification, or defective mental preparation, and the candidate probably be spared the expense and trouble of a useless journey and the mortification of rejection.

Under authority of the act approved June 6, 1874, an assistant judge-advocate of the Army was assigned to duty at West Point, as professor of law. Prior to his assignment, instruction in the department of law was conducted by the chaplain, whose duties were very onerous, and were multiplied by those incident to the chair of ethics, which he also filled.

Personal observation enabled the members of the Board of Visitors to speak understandingly in their report of the wants of the academy. Their recommendations concerning the construction of the hospital and of the school-house for the instruction of the children of those employed on the post, are particularly recommended for favorable consideration.

In two previous reports the increase of the Military Academy band has been recommended, and attention is again invited to the subject. It is needless to reiterate the arguments heretofore presented in favor of this recommendation; but it is earnestly hoped that the bill heretofore presented may be passed at the coming session of Congress.

Plans for the erection of a central building for a military museum at West Point will be submitted to Congress during its next session, with the reasons which influence the Department in recommending an appropriation for that purpose.

A thorough examination as to the requirements of the institution, and much reflection on the subject, satisfy me that a professorship of rhetoric and English literature should be established without delay to accomplish good results. Should this be arranged, a part of the time now occupied by other studies must be taken. This can readily be done, for I have never been able to understand why the time which might be intelligently devoted to the instruction of the cadets in the rhetoric and literature of our own language—so necessary, so useful, and so appreciated in all positions in life—should be lost and frittered away by attempting to give them a smattering of Spanish.

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PUBLICATION OF THE OFFICIAL RECORDS OF THE WAR OF THE REBELLION.

The sum of $15,000 was included in the appropriation "For sundry civil expenses of the Government," approved June 22, 1874, "to enable the Secretary of War to begin the publication of the official records of the war of the rebellion, both of the Union and confederate armies."

This is a work of no inconsiderable magnitude; it certainly is of great importance and interest. It has been commenced with a determination to spare no pains to make the arrangement of the records simple and complete; at the same time to omit all irrelevant matter. This object will be defeated by too great haste, but, by the economical use of time and labor, a very great advance will be effected within this fiscal year with the sum appropriated. Those unfamiliar with the subject can form no adequate idea of the immense amount of valuable material to be examined and arranged for publication. The estimate for this purpose for the next year is $15,000, the same as for this year, but I have come to the conclusion, since submitting it, that the appropriation should be much larger. The sum given for the present year will be expended long before its close, and it would serve to facilitate and hasten the completion of the work if a liberal appropriation, in addition to that already made, should be so passed as to become immediately available, without waiting until the new fiscal year begins.

To the clerks of the Department to whom the work is assigned, who have been chosen on account of their comprehensive knowledge of the records and events of the war, much credit is due; and, as a measure of justice to compensate them for their extra labor, I recommend that, when appropriations are made, authority be given to pay them for such extra service an additional sum beyond their salary as clerks.

REGULATIONS.

At the last session of Congress an act was passed by the House of Representatives authorizing the President to make and publish regulations for the government of the Army in accordance with existing laws. It is of the utmost importance to the Army that this measure shall become a law. The edition of old regulations has for some time been exhausted; and, moreover, they have necessarily been changed by numerous orders. In fact the Department has not now a copy of Army Regulations to furnish officers intrusted with important responsibilities, to whom they are essentially necessary.

WM. W. BELKNAP,
Secretary of War.

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REPORT OF THE GENERAL OF THE ARMY.

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REPORT

OF

THE GENERAL OF THE ARMY.

HEADQUARTERS ARMY OF THE UNITED STATES,
Saint Louis, Mo., October 24, 1874.

SIR: I have the honor to submit the usual tabular statement showing the strength of the Army, according to the latest returns received up to October 15, 1874, giving the strength and status of the enlisted men of each company, together with a consolidation by regiments and detachments, making the total of enlisted men, October 15, 1874, 26,441. I have no doubt that by the first of January, 1875, the number of enlisted men will be reduced, by the ordinary casualties, discharges, and deaths, to the number limited by law, viz. 25,000 men; and will venture the expression of opinion that this limit forces the companies to so small a standard that the efficiency of the service is greatly impaired thereby. It is utterly impossible to maintain the companies on remote stations up to the very small legal standard, because months must necessarily elapse after discharges and deaths before recruits can be sent from the general rendezvous.

Since the completion of this statement several changes have been made in the stations of the several regiments at the South, and of the Thirteenth Infantry, ordered by the War Department from the Platte to the Department of the Gulf, and of the six companies of the Seventh Cavalry ordered from the Department of Dakota to the South, for which a supplementary statement is made, and inclosed with this.

For the purpose of military administration the whole area of the United States is divided into nine departments, and these are consolidated into four geographical divisions:

1st. The Military Division of the Atlantic is commanded by Maj. Gen. W. S. Hancock, with his headquarters in New York City. I inclose his annual report, which gives a full and clear history of the changes that have occurred during the year, and the present condition of the troops serving under his command.

2d. The Military Division of the South is commanded by Maj. Gen. Irvin McDowell, headquarters at Louisville, Ky., composed of the Departments of the South, commanded by himself, and of the Gulf, commanded by Col. and Bvt. Maj. Gen. Wm. H. Emory, headquarters at New Orleans. The reports of these officers are also inclosed, and explain the condition of their commands, with the changes made during the year. Since the rendition of these reports, owing to the disturbed condition of civil affairs there, and the constant requisition of the civil officers for military help, the Thirteenth Infantry has been ordered to

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New Orleans, and six companies of the Seventh Cavalry have also been ordered to the Division of the South from the Department of Dakota. These troops, together with what were previously on duty there, are deemed amply adequate to the necessity.

3d. The Military Division of the Missouri, commanded by Lieut. Gen. P. H. Sheridan, with his headquarters at Chicago, Ill., is composed of four Departments, viz: Dakota, commanded by Brig. Gen. A. H. Terry, headquarters at Saint Paul, Minn.; Department of the Platte, Brig. Gen. E. O. C. Ord, headquarters at Omaha, Nebr.; Department of the Missouri, Brig. Gen. John Pope, headquarters at Fort Leavenworth; and Department of Texas, Brig. Gen. C. C. Augur, headquarters at San Antonio.

This important division embraces substantially all the territory east of the Rocky Mountains to the Mississippi River, and east including the States of Illinois and Minnesota. Within this immense area are grouped most of the Indian tribes, who are in a transitive state, from savage barbarism to a condition of comparative civilization. It is within this area that there has been, and must continue for years to come, that contact of the frontier settlers with the aboriginal savage, resulting in a chronic state of war. During the past year, by the extraordinary activity of the troops, and the good sense of our military officers, the frontier has been comparatively safe.

On the northern line of Texas and southern line of Kansas the untamed savages, Kiowas, Comanches, Cheyennes, and Arapahoes, began this season their usual raids, and as the Indian agents confessed their utter inability to manage their respective tribes by the usual humane and Christian treatment, the whole subject was turned over to the War Department and committed to the management of Lieutenant-General Sheridan, who has laid hold of it with his accustomed energy, and for full details I refer to his admirable report herewith, together with those of the department commanders, Generals Pope and Augur. General Sheridan is at this moment down in the Indian country, near Fort Sill, giving his personal attention to the subject, and I have no doubt before the winter is over these Indians will learn a lesson that will enable the civil agents to bring them within the sphere of humanization if not of civilization.

General Ord has maintained admirably the safety of the great Pacific Railway, now one of the grand avenues of travel for the whole world; and General A. H. Terry, now at the north, has in like manner given security to an extensive and valuable frontier, and has pushed explorations into the Black Hill region, and into the beautiful valleys that lie along the streams which constitute the sources of the Yellowstone and Missouri Rivers. Their reports are also herewith inclosed.

4th. The Military Division of the Pacific is commanded by Maj. Gen. J. M. Schofield, headquarters at San Francisco, with three departments, that of California, commanded by himself; that of the Columbia, recently commanded by Col. Jeff. C. Davis, whose report is herewith inclosed, but now is commanded by Brig. Gen. O. O. Howard, headquarters at Portland, Oreg.; and of Arizona, Brig. Gen. George Crook, headquarters at Prescott.

I inclose the annual reports of all the generals, and refer to them for valuable information touching these remote States and Territories. They are luckily so remote from headquarters that to the officers on the spot is left the supreme control of all the details, and the consequence is the utmost harmony of action and economy of administration.

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I have not the least doubt that to General Schofield's judicious supervision and the prompt action of Gen. Jeff. C. Davis, in Oregon, last spring, we are indebted to a peaceful solution of what for a time threatened to be a war with the Shoshones and Snake Indians. Also General Crook, being armed with full authority, and but little complicated with civil agents and administration, has maintained an almost uninterrupted peace in that most difficult country, Arizona.

I inclose the reports of all these officers, and refer to them with pride, as samples of military literature, clear and concise in the statement of facts, and demonstrating that the small Army of the United States, called a peace establishment, is the hardest worked body of men in this or any country. The discipline and behavior of the officers and men have been worthy of all praise; and, whether employed on the extreme and distant frontier, or in aiding the civil officers in the execution of civil process, have been a model for the imitation of all good men.

On the 15th day of October, with the assent of the President and Secretary of War, I removed my headquarters from Washington, D. C., to Saint Louis, Mo., where I am at present established, prepared to execute any duties that may be devolved on me by proper authority. Here I am centrally located, and should occasion arise, I can personally proceed to any point of this continent where my services are needed.

Again inviting a careful perusal of the annual reports, herewith, that embrace a full and complete history of the operations of the Regular Army for the past year,

I am, most respectfully, your obedient servant,

W. T. SHERMAN,
General.

Hon. W. W. BELKNAP,
Secretary of War.

Statement showing the organization of the enlisted men of the Regular Army, compiled from returns received at the Adjutant-General's Office up to October 15, 1874.

FIRST REGIMENT OF CAVALRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Benicia Barracks, Cal
Non-commissioned staff and band.	23	.....do.....	Do.
A	65	.....do.....	Do.
B	52	.....do.....	Fort Klamath, Oreg.
C	62	.....do.....	Camp McDermit, Nev.
D	71	.....do.....	Benicia Barracks, Cal.
E	61	.....do.....	Fort Lapwai, Idaho.
F	43	..... do.....	Fort Walla-Walla, Wash.
G	58	.....do.....	Camp Bidwell, Cal.
H	49	.....do.....	Camp Harney, Oreg.
I	57	.....do.....	Camp Halleck, Nev.
K	49	.....do.....	Camp Harney, Oreg.
L	54	.....do.....	Fort Walla-Walla, Wash.
M	34	.....do.....	Do.
Total	678		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

SECOND REGIMENT OF CAVALRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Fort Sanders, Wyo.
Non-commissioned staff and band.	27	.....do.....	Do.
A	66	.....do.....	Fort Fred. Steele, Wyo.
B	70	.....do.....	Camp Brown, Wyo.
C	70	.....do.....	Fort Laramie, Wyo.
D	62	.....do.....	Camp Stambaugh, Wyo.
E	61	.....do.....	Omaha Barracks, Nebr.
F	59	.....do.....	Fort Ellis, Mont.
G	61	.....do.....	Do.
H	59	.....do.....	Do.
I	66	.....do.....	Fort Sanders, Wyo.
K	57	.....do.....	Omaha Barracks, Nebr.
L	61	.....do.....	Fort Ellis, Mont.
M	82	.....do.....	Fort Laramie, Wyo.
Total	801		

THIRD REGIMENT OF CAVALRY.

Headquarters	.....	Aug. 31, 1874	Fort D. A. Russell, Wyo.
Non-commissioned staff and band.	30	.....do.....	Do.
A	62	.....do.....	Sidney Barracks, Nebr.
B	72	.....do.....	Spotted Tail's Agency, Wyo.
C	60	.....do.....	Fort Fetterman, Wyo.
D	72	.....do.....	Fort D. A. Russell, Wyo.
E	56	.....do.....	Sidney Barracks, Nebr.
F	57	.....do.....	Fort McPherson, Nebr.
G	71	.....do.....	Camp Robinson, Nebr.
H	54	.....do.....	Fort D. A. Russell, Wyo.
I	64	.....do.....	Fort McPherson, Nebr.
K	80	.....do.....	Do.
L	60	.....do.....	Fort D. A. Russell, Wyo.
M	58	.....do.....	Fort McPherson, Nebr.
Total	796		

FOURTH REGIMENT OF CAVALRY.

Headquarters	.....	Aug. 31, 1874	Fort Clark, Tex.
Non-commissioned staff and band.	12	.....do.....	Do.
A	66	.....do.....	Fort McKavett, Tex.
B	62	.....do.....	Fort Clark, Tex.
C	66	.....do.....	Do.
D	62	.....do.....	Do.
E	55	.....do.....	Fort Duncan, Tex.
F	61	.....do.....	Fort Clark, Tex.
G	62	.....do.....	Do.
H	77	.....do.....	Fort McKavett, Tex.
I	64	.....do.....	Fort Clark, Tex.
K	54	.....do.....	Fort Duncan, Tex.
L	67	.....do.....	Fort Clark, Tex.
M	64	.....do.....	Do.
Total	772		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

FIFTH REGIMENT OF CAVALRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Camp Lowell, Ariz.
Non-commissioned staff and band.	24	.....do.....	Do.
A	69	.....do.....	Camp Verde, Ariz.
B	67	.....do.....	Camp Apache, Ariz.
C	74	.....do.....	Do.
D	69	.....do.....	Camp Bowie, Ariz.
E	71	.....do.....	Camp McDowell, Ariz.
F	71	.....do.....	Camp Grant, Ariz.
G	72	.....do.....	Fort Whipple, Ariz.
H	71	.....do.....	Camp Lowell, Ariz.
I	76	.....do.....	Camp Apache, Ariz.
K	64	.....do.....	Camp Verde, Ariz.
L	68	.....do.....	Camp Grant, Ariz.
M	64	.....do.....	Do.
Total	860		

SIXTH REGIMENT OF CAVALRY.

Headquarters	.....	Aug. 31, 1874	Fort Hays, Kans.
Non-commissioned staff and band.	19	.....do.....	Do.
A	70	.....do.....	Fort Lyon, Col.
B	71	.....do.....	Fort Hays, Kans.
C	75	.....do.....	Do.
D	72	.....do.....	Do.
E	75	.....do.....	Fort Gibson, Ind. T.
F	59	June 30, 1874	Fort Dodge, Kans.
G	64	Aug. 31, 1874	Do.
H	71	.....do.....	Fort Lyon, Col.
I	73	.....do.....	Camp Supply, Ind. T.
K	70	.....do.....	Do.
L	69	.....do.....	Fort Dodge, Kans.
M	67	June 30, 1874	Fort Lyon, Col.
Total	855		

SEVENTH REGIMENT OF CAVALRY.

Headquarters	.....	Aug. 31, 1874	Fort A. Lincoln, Dak.
Non-commissioned staff and band.	23	.....do.....	Do.
A	62	.....do.....	Do.
B	64	.....do.....	Do.
C	65	.....do.....	Fort Rice, Dak.
D	67	.....do.....	Fort Totten, Dak.
E	68	.....do.....	Fort A. Lincoln, Dak.
F	72	.....do.....	Do.
G	70	.....do.....	Do.
H	79	.....do.....	Fort Rice, Dak.
I	77	.....do.....	Fort Totten, Dak.
K	64	.....do.....	Fort Rice, Dak.
L	67	.....do.....	Fort A. Lincoln, Dak.
M	68	.....do.....	Fort Rice, Dak.
Total	846		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

EIGHTH REGIMENT OF CAVALRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Santa Fé, N. Mex.
Non-commissioned staff and band	20	....do.....	Do.
A	70	....do.....	Fort Bayard, N. Mex.
B	68	....do.....	Fort Union, N. Mex.
C	67	....do.....	Fort Wingate, N. Mex.
D	62	....do.....	Fort Stanton, N. Mex.
E	71	....do.....	Fort McRae, N. Mex.
F	64	....do.....	Fort Garland, Col.
G	66	....do.....	Fort Stanton, N. Mex.
H	73	....do.....	Fort Wingate, N. Mex.
I	76	....do.....	Fort Bayard, N. Mex.
K	65	....do.....	Fort Wingate, N. Mex.
L	78	....do.....	Fort Union, N. Mex.
M	63	....do.....	Do.
Total	843		

NINTH REGIMENT OF CAVALRY.

Headquarters	.....	Aug. 31, 1874.	Ringgold Barracks, Tex.
Non-commissioned staff and band	22	....do.....	Do.
A	51	....do.....	Fort Concho, Tex.
B	69	....do.....	Ringgold Barracks, Tex.
C	64	....do.....	Do.
D	49	....do.....	Fort Concho, Tex.
E	55	....do.....	Do.
F	48	....do.....	Do.
G	70	....do.....	Ringgold Barracks, Tex.
H	71	....do.....	Do.
I	47	....do.....	Fort Davis, Tex.
K	69	....do.....	Fort Concho, Tex.
L	68	....do.....	Ringgold Barracks, Tex.
M	53	....do.....	Fort Stockton, Tex.
Total	736		

TENTH REGIMENT OF CAVALRY.

Headquarters	.....	Aug. 31, 1874	Fort Sill, Ind. T.
Non-commissioned staff and band	31	....do.....	Do.
A	78	....do.....	Fort Concho, Tex.
B	69	....do.....	Fort Sill, Ind. T.
C	64	....do.....	Do.
D	76	June 30, 1874	Fort Griffin, Tex.
E	69	Aug. 31, 1874	Fort Richardson, Tex.
F	73	....do.....	Fort Griffin, Tex.
G	66	....do.....	Do.
H	70	....do.....	Fort Sill, Ind. T.
I	67	....do.....	Fort Richardson, Tex.
K	74	....do.....	Fort Sill, Ind. T.
L	76	....do.....	Fort Richardson, Tex.
M	74	....do.....	Fort Sill, Ind. T.
Recruits	2	.....	Left Saint Louis Barracks September 28, 1874.
Total	889		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

FIRST REGIMENT OF ARTILLERY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Charleston, S. C.
Non-commissioned staff and band	25	.....do.....	Do.
A	22	.....do.....	Fort Barrancas, Fla.
B	46	.....do.....	Saint Augustine, Fla.
C	41	.....do.....	Do.
D	50	.....do.....	Savannah, Ga.
E	37	.....do.....	Key West, Fla.
F	27	.....do.....	New Orleans, La.
G	58	.....do.....	Fort Monroe, Va.
H	46	.....do.....	Charleston, S. C.
I	46	.....do.....	Key West, Fla.
Battery K	67	.....do.....	Charleston, S. C.
L	34	.....do.....	New Orleans, La.
M	36	.....do.....	Do.
Recruits	2	.....	Left Fort Columbus, September 5, 1874.
Total	537		

SECOND REGIMENT OF ARTILLERY.

Headquarters	.....	Aug. 31, 1874	Fort McHenry, Md.
Non-commissioned staff and band	31	.....do.....	Do.
Battery A	80	.....do.....	Do.
B	51	.....do.....	Fort Foote, Md.
C	55	.....do.....	Fort McHenry, Md.
D	40	.....do.....	Barnwell, S. C.
E	44	.....do.....	Marion, S. C.
F	47	.....do.....	Marion, N. C.
G	40	.....do.....	Spartanburgh, S. C.
H	56	.....do.....	Fort McHenry, Md.
I	43	.....do.....	Raleigh, N. C.
K	65	.....do.....	Fort Monroe, Va.
L	40	.....do.....	Fort Macon, N. C.
M	44	.....do.....	Unionville, S. C.
Recruits	5	.....	Left Fort Columbus, September 12, 1874.
Recruits	4	.....	Attached to company K for instruction.
Total	645		

THIRD REGIMENT OF ARTILLERY.

Headquarters	.....	Aug. 31, 1874	Fort Hamilton, New York Harbor.
Non-commissioned staff and band	28	.....do.....	Do.
A	66	June 30, 1874	Fort Monroe, Va.
B	38	Aug. 31, 1874	Fort Niagara, N. Y.
Battery C	80	.....do.....	Fort Hamilton, New York Harbor.
D	33	.....do.....	Madison Barracks, N. Y.
E	47	.....do.....	Fort Hamilton, New York Harbor.
F	46	.....do.....	Fort Ontario, N. Y.
G	46	.....do.....	Fort Hamilton, New York Harbor.
H	48	.....do.....	Fort Warren, Mass.
I	52	.....do.....	Fort Hamilton, New York Harbor.
K	45	.....do.....	Fort Wadsworth, New York Harbor.
L	46	.....do.....	Fort Wood, New York Harbor.
M	34	.....do.....	David's Island, New York Harbor.
Recruits	7	.....	Attached to Company A for instruction.
Recruits	2	.....	Left Fort Columbus, September 24, 1874.
Total	618		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

FOURTH REGIMENT OF ARTILLERY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Presidio, San Francisco, Cal.
Non-commissioned staff and band	21	....do....	Do.
A	27	....do....	Do.
Battery B	78	....do....	Do.
C	34	....do....	Do.
D	43	....do....	Do.
E	52	....do....	Fort Stevens, Oreg.
F	49	....do....	Sitka, Alaska.
G	58	....do....	Point San José, Cal.
H	46	....do....	Fort Cape Disappointment, Wash.
I	62	....do....	Fort Monroe, Va.
K	42	June 30, 1874	Alcatraz Island, Cal.
L	51	....do....	Sitka, Alaska.
M	38	Aug. 31, 1874	Presidio, San Francisco, Cal.
Unassigned recruits	8	.....	
Recruits	4	.....	Attached to Company I for instruction.
Musician	1	.....	Left Fort Columbus, September 5, 1874.
Total	614		

FIFTH REGIMENT OF ARTILLERY.

Headquarters	.....	Aug. 31, 1874	Fort Adams, R. I.
Non-commissioned staff and band	20	....do....	Do.
A	35	....do....	Do.
B	50	....do....	Do.
C	64	....do....	Fort Monroe, Va.
D	44	....do....	Fort Warren, Mass.
E	51	....do....	Fort Independence, Mass.
Battery F	62	....do....	Fort Adams, R. I.
G	45	....do....	Plattsburgh Barracks, N. Y.
H	31	....do....	Fort Trumbull, Conn.
I	39	....do....	Do.
K	37	....do....	Madison Barracks, N. Y.
L	34	....do....	Fort Adams, R. I.
M	37	....do....	Fort Preble, Me.
Recruits	3	.....	Attached to Company C for instruction.
Musician	1	.....	Left Fort Columbus, September 5, 1874.
Total	553		

FIRST REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Randall, Dak.
Non-commissioned staff and band	22	....do....	Do.
A	53	....do....	Lower Brulé Agency, Dak.
B	48	....do....	Fort Sully, Dak.
C	49	....do....	Fort Randall, Dak.
D	58	....do....	Do.
E	57	....do....	Fort Sully, Dak.
F	50	....do....	Do.
G	39	....do....	Fort Randall, Dak.
H	42	....do....	Fort Sully, Dak.
I	47	....do....	Fort Randall, Dak.
K	37	....do....	Do.
Total	502		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

SECOND REGIMENT OF INFANTRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Mount Vernon Barracks, Ala.
Non-commissioned staff and band	28	.....do.....	Do.
A	42	.....do.....	Eutaw, Ala.
B	46	.....do.....	Carrollton, Ala.
C	51	.....do.....	Huntsville, Ala.
D	45	.....do.....	Demopolis, Ala.
E	50	.....do.....	Chattanooga, Tenn.
F	51	.....do.....	Tuscaloosa, Ala.
G	49	.....do.....	New Orleans, La.
H	42	.....do.....	Eufaula, Ala.
I	44	.....do.....	Butler, Ala.
K	50	.....do.....	Mobile, Ala.
Total	498		

THIRD REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	New Orleans, La.
Non-commissioned staff and band	21	.....do.....	Do.
A	53	.....do.....	Do.
B	50	.....do.....	Monroe, La.
C	45	.....do.....	New Orleans, La.
D	42	.....do.....	Do.
E	43	.....do.....	Coushatta, La.
F	61	.....do.....	New Orleans, La.
G	38	.....do.....	Do.
H	42	.....do.....	Do.
I	37	.....do.....	Do.
K	41	.....do.....	Shreveport, La.
Total	473		

FOURTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Bridger, Wyo.
Non-commissioned staff and band	21	.....do.....	Do.
A	57	.....do.....	Fort Fetterman, Wyo.
B	53	.....do.....	Fort Bridger, Wyo.
C	46	.....do.....	Fort Fetterman, Wyo.
D	47	.....do.....	Fort Laramie, Wyo.
E	46	.....do.....	Do.
F	44	.....do.....	Fort Fetterman, Wyo.
G	55	.....do.....	Fort Sanders, Wyo.
H	52	.....do.....	Fort Bridger, Wyo.
I	49	.....do.....	Fort Fetterman, Wyo.
K	53	.....do.....	Fort Bridger, Wyo.
Total	523		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

FIFTH REGIMENT OF INFANTRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Fort Leavenworth, Kans.
Non-commissioned staff and band	20	.....do.....	Do.
A	56	.....do.....	Do.
B	50	.....do.....	Fort Gibson, Ind. T.
C	53	.....do.....	Fort Riley, Kans.
D	58	.....do.....	Fort Leavenworth, Kans.
E	56	June 30, 1874	Fort Riley, Kans.
F	40	Aug. 31, 1874	Fort Leavenworth, Kans.
G	44	.....do.....	Do.
H	45	.....do.....	Do.
I	57	June 30, 1874	Do.
K	51	Aug. 31, 1874	Do.
Recruits	19	.....	27 left Newport Barracks July 26, 1874. Eight joined.
Total	549		

SIXTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Buford, Dak.
Non-commissioned staff and band	22	.....do.....	Do.
A	45	.....do.....	Fort A. Lincoln, Dak.
B	48	.....do.....	Do.
C	50	.....do.....	Fort Buford, Dak.
D	50	.....do.....	Do.
E	53	.....do.....	Do.
F	52	.....do.....	Do.
G	47	.....do.....	Do.
H	52	.....do.....	Fort Stevenson, Dak.
I	51	.....do.....	Fort Buford, Dak.
K	52	.....do.....	Fort Stevenson, Dak.
Recruits	25	.....	Left Newport Barracks July 28, 1874.
Total	547		

SEVENTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Shaw, Mont.
Non-commissioned staff and band	20	.....do.....	Do.
A	48	.....do.....	Fort Ellis, Mont.
B	50	.....do.....	Fort Benton, Mont.
C	40	.....do.....	Fort Shaw, Mont.
D	43	.....do.....	Do.
E	52	.....do.....	Camp Baker, Mont.
F	49	.....do.....	Fort Shaw, Mont.
G	47	.....do.....	Do.
H	42	.....do.....	Camp Baker, Mont.
I	44	.....do.....	Fort Shaw, Mont.
K	53	.....do.....	Do.
Total	488		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

EIGHTH REGIMENT OF INFANTRY.

Companies, &c.	Enlisted men present and absent	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Fort Whipple, Ariz.
Non-commissioned staff and band	21	.....do.....	Do.
A	54	June 30, 1874	Camp Verde, Ariz.
B	61	.....do.....	Do.
C	56	Aug. 31, 1874	Camp McDowell, Ariz.
D	42	.....do.....	Camp Lowell, Ariz.
E	48	June 30, 1874	Camp Apache, Ariz.
F	56	.....do.....	Fort Whipple, Ariz.
G	42	Aug. 31, 1874	Camp Lowell, Ariz.
H	44	.....do.....	Fort Yuma, Cal.
I	46	.....do.....	Camp Grant, Ariz.
K	60	June 30, 1874	Camp Apache, Ariz.
Recruits	8	.....	Unassigned.
Total	538		

NINTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Laramie, Wyo.
Non-commissioned staff and band	19	.....do.....	Do.
A	55	.....do.....	Camp Robinson, Nebr.
B	52	.....do.....	Fort Laramie, Wyo.
C	59	.....do.....	Omaha Barracks, Nebr.
D	51	.....do.....	Spotted Tail's Agency, Wyo.
E	51	.....do.....	Fort Laramie, Wyo.
F	49	.....do.....	Spotted Tail's Agency, Wyo.
G	51	.....do.....	Do.
H	47	.....do.....	Fort Laramie, Wyo.
I	42	.....do.....	Camp Robinson, Nebr.
K	51	.....do.....	Spotted Tail's Agency, Wyo.
Recruits	25	.....	Left Newport Barracks July 28, 1874.
Total	552		

TENTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort McKavett, Tex.
Non-commissioned staff and band	25	.....do.....	Do.
A	56	.....do.....	Fort Concho, Tex.
B	54	.....do.....	Fort Stockton, Tex.
C	53	.....do.....	Fort McKavett, Tex.
D	60	.....do.....	Austin, Tex.
E	46	.....do.....	Fort McKavett, Tex.
F	48	.....do.....	Do.
G	45	.....do.....	Fort Clark, Tex.
H	49	.....do.....	Do.
I	53	.....do.....	Fort McKavett, Tex.
K	50	.....do.....	Fort Clark, Tex.
Total	539		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

ELEVENTH REGIMENT OF INFANTRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Fort Richardson, Tex.
Non-commissioned staff and band	23	.....do.....	Do.
A	50	.....do.....	Fort Griffin, Tex.
B	51	.....do.....	Fort Richardson, Tex.
C	54	.....do.....	Fort Sill, Ind. T.
D	56	.....do.....	Do.
E	51	.....do.....	Fort Richardson, Tex.
F	56	.....do.....	Fort Griffin, Tex.
G	53	.....do.....	Do.
H	38	.....do.....	Fort Concho, Tex.
I	56	.....do.....	Fort Richardson, Tex.
K	51	.....do.....	Do.
Total	539		

TWELFTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Angel Island, Cal.
Non-commissioned staff and band	19	.....do.....	Do.
A	40	.....do.....	Camp Wright, Cal.
B	41	.....do.....	Fort Yuma, Cal.
C	47	.....do.....	Fort Hall, Idaho.
D	40	.....do.....	Camp Independence, Cal.
E	37	.....do.....	Camp Gaston, Cal.
F	41	.....do.....	Camp at La Paz, Ariz.
G	53	.....do.....	Angel Island, Cal.
H	41	.....do.....	Camp Halleck, Nev.
I	48	.....do.....	Camp Mohave, Ariz.
K	44	.....do.....	Camp Gaston, Cal.
Total	451		

THIRTEENTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Sidney Barracks, Nebr.
Non-commissioned staff and band	22	.....do.....	Do.
A	48	.....do.....	Camp Brown, Wyo.
B	50	.....do.....	Camp Robinson, Nebr.
C	55	.....do.....	Camp Stambaugh, Wyo.
D	40	.....do.....	Fort Fred Steele, Wyo.
E	41	.....do.....	Fort Sanders, Wyo.
F	42	.....do.....	Camp Robinson, Nebr.
G	44	.....do.....	Fort Fred Steele, Wyo.
H	35	.....do.....	Sidney Barracks, Nebr.
I	47	.....do.....	Fort Fred Steele, Wyo.
K	54	.....do.....	Do.
Total	478		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

FOURTEENTH REGIMENT OF INFANTRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Camp Douglas, Utah.
Non-commissioned staff and band	23	....do....	Do.
A	51	....do....	Do.
B	39	....do....	Do.
C	48	....do....	Do.
D	47	....do....	Fort Cameron, Utah.
E	42	....do....	Do.
F	44	....do....	Camp Douglas, Utah.
G	43	....do....	Fort Cameron, Utah.
H	49	....do....	Camp Douglas, Utah.
I	42	....do....	Fort Cameron, Utah.
K	45	....do....	Camp Douglas, Utah.
Total	473		

FIFTEENTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Garland, Colo.
Non-commissioned staff and band	18	....do....	Do.
A	48	....do....	Fort Wingate, N. Mex.
B	54	....do....	Fort Craig, N. Mex.
C	50	....do....	Fort Union, N. Mex.
D	52	....do....	Fort Garland, Colo.
E	51	....do....	Fort Bayard, N. Mex.
F	55	....do....	Fort Craig, N. Mex.
G	54	....do....	Fort Bayard, N. Mex.
H	56	....do....	Fort Selden, N. Mex.
I	50	....do....	Do.
K	51	....do....	Fort Wingate, N. Mex.
Total	539		

SIXTEENTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Nashville, Tenn.
Non-commissioned staff and band	26	....do....	Do.
A	56	....do....	Lebanon, Ky.
B	54	....do....	Colfax, La.
C	64	June 30, 1874	Little Rock, Ark.
D	53	Aug. 31, 1874	Jackson, Miss.
E	44	....do....	Lancaster, Ky.
F	53	....do....	Nashville, Tenn.
G	53	....do....	Humboldt, Tenn.
H	55	....do....	Baton Rouge, La.
I	54	....do....	Little Rock, Ark.
K	55	....do....	Frankfort, Ky.
Recruits	3	.....	Left Newport Barracks September 7, 1870.
Total	570		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

SEVENTEENTH REGIMENT OF INFANTRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Fort Abercrombie, Dak.
Non-commissioned staff and band	19	....do.....	Do.
A	47	....do.....	Do.
B	47	....do.....	Fort Wadsworth, Dak.
C	42	....do.....	Do.
D	45	....do.....	Camp Hancock, Edwinton, Dak.
E	52	....do.....	Grand River Agency, Dak.
F	44	....do.....	Fort Abercrombie, Dak.
G	51	....do.....	Grand River Agency, Dak.
H	29	....do.....	Fort A. Lincoln, Dak.
I	52	....do.....	Big Cheyenne Agency, Dak.
K	50	....do.....	Do.
Recruit	1	.....	Left Fort Columbus July 28, 1874.
Recruits	2	.....	Left Newport Barracks July 28, 1874.
Total	481		

EIGHTEENTH REGIMENT OF INFANTRY.

Headquarters	.....	Sept. 30, 1874	Columbia, S. C.
Non-commissioned staff and band	24	....do.....	Do.
A	43	....do.....	New Orleans, La.
B	47	....do.....	Columbia, S. C.
C	35	....do.....	Yorkville, S. C.
D	40	....do.....	Edgefield, S. C.
E	36	....do.....	Atlanta, Ga.
F	39	....do.....	Columbia, S. C.
G	41	....do.....	New Orleans, La.
H	46	....do.....	Abbeville, S. C.
I	49	....do.....	New Orleans, La.
K	41	....do.....	Newberry, S. C.
			80 recruits ordered January 6, 1874.
Total	441		

NINETEENTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Lyon, Colo.
Non-commissioned staff and band	20	....do.....	Do.
A	55	....do.....	Fort Larned, Kans.
B	52	....do.....	Do.
C	47	....do.....	Fort Dodge, Kans.
D	50	....do.....	Fort Lyon, Colo.
E	42	....do.....	Camp Supply, Ind. T.
F	49	....do.....	Do.
G	49	....do.....	Fort Dodge, Kans.
H	50	....do.....	Camp Supply, Ind. T.
I	52	....do.....	Fort Lyon, Colo.
K	48	....do.....	Fort Wallace, Kans.
Recruits	4	.....	Left Fort Columbus, September 11, 1874.
Total	518		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

TWENTIETH REGIMENT OF INFANTRY.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Fort Snelling, Minn.
Non-commissioned staff and band	20	.....do.....	Do.
A	45	.....do.....	Fort Seward, Dak.
B	44	.....do.....	Fort Ripley, Minn.
C	54	.....do.....	Fort Snelling, Minn.
D	30	.....do.....	Fort Pembina, Dak.
E	36	.....do.....	Fort Totten, Dak.
F	41	.....do.....	Fort Pembina, Dak.
G	40	.....do.....	Fort Ripley, Minn.
H	49	.....do.....	Fort Snelling, Minn.
I	41	.....do.....	Fort Pembina, Dak.
K	42	.....do.....	Fort Totten, Dak.
Unassigned recruits	3	.....	25 recruits ordered July 15, 1874.
Total	445		

TWENTY-FIRST REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Vancouver, Wash.
Non-commissioned staff and band	20	.....do.....	Do.
A	53	.....do.....	Camp Harney, Oreg.
B	46	.....do.....	Fort Walla Walla, Wash.
C	63	.....do.....	Fort Townsend, Wash.
D	36	.....do.....	Camp Bidwell, Cal.
E	45	.....do.....	Fort Colville, Wash.
F	46	.....do.....	Fort Klamath, Oreg.
G	51	.....do.....	Fort Lapwai, Idaho.
H	46	.....do.....	Fort Vancouver, Wash.
I	48	.....do.....	Fort Walla Walla, Wash.
K	49	.....do.....	Fort Boise, Idaho.
Total	503		

TWENTY-SECOND REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Wayne, Mich.
Non-commissioned staff and band	29	.....do.....	Do.
A	60	.....do.....	New Orleans, La.
B	42	.....do.....	Do.
C	43	.....do.....	Fort Brady, Mich.
D	47	.....do.....	New Orleans, La.
E	49	.....do.....	Fort Mackinac, Mich.
F	48	.....do.....	New Orleans, La.
G	46	.....do.....	Fort Brady, Mich.
H	46	.....do.....	New Orleans, La.
I	50	.....do.....	Do.
K	34	.....do.....	Do.
Musicians	4	.....	Left Fort Columbus September 4, 1874.
Total	498		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

TWENTY-THIRD REGIMENT OF INFANTRY.

Companies &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters	.....	Aug. 31, 1874	Omaha Barracks, Nebr.
Non-commissioned staff and band	20	..... do.....	Do.
A	50	..... do.....	Do.
B	48	..... do.....	Do.
C	57	..... do.....	Do.
D	45	..... do.....	Fort D. A. Russell, Wyo.
E	50	..... do.....	Cheyenne Depot, Wyo.
F	51	..... do.....	Fort D. A. Russell, Wyo.
G	43	..... do.....	Omaha Barracks, Nebr.
H	58	..... do.....	Fort D. A. Russell, Wyo.
I	49	..... do.....	Omaha Barracks, Nebr.
K	49	..... do.....	Do.
Musician	1	.....	Left Fort Columbus, October 6, 1874.
Total	521		

TWENTY-FOURTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Brown, Tex.
Non-commissioned staff and band	24	..... do.....	Do.
A	55	..... do.....	Ringgold Barracks, Tex.
B	57	..... do.....	Do.
C	57	..... do.....	Fort Brown, Tex.
D	50	..... do.....	Fort Duncan, Tex.
E	57	..... do.....	Fort Brown, Tex.
F	45	..... do.....	Fort McIntosh, Tex.
G	57	..... do.....	Fort Brown, Tex.
H	56	..... do.....	Do.
I	53	..... do.....	Do.
K	58	..... do.....	Ringgold Barracks, Tex.
Total	569		

TWENTY-FIFTH REGIMENT OF INFANTRY.

Headquarters	.....	Aug. 31, 1874	Fort Davis, Tex.
Non-commissioned staff and band	19	..... do.....	Do.
A	46	..... do.....	Fort Duncan, Tex.
B	51	..... do.....	Fort Quitman, Tex.
C	57	..... do.....	Fort Sill, Ind. T.
D	48	..... do.....	Fort Davis, Tex.
E	54	..... do.....	Do.
F	40	..... do.....	Fort Stockton, Tex.
G	46	..... do.....	Fort Davis, Tex.
H	49	..... do.....	Fort Bliss, Tex.
I	58	..... do.....	Fort Sill, Ind. T.
K	50	..... do.....	Fort Stockton, Tex.
Recruit	1	.....	Left Newport Barracks, July 28, 1874.
Total	519		

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Statement showing the organization of enlisted men of the Regular Army, &c.—Continued.

ENGINEER BATTALION.

Companies, &c.	Enlisted men present and absent.	Date of report.	Station.
Headquarters		Aug. 31, 1874	Willet's Point, New York Harbor.
Non-commissioned staff, and band	17	do	Do.
A	77	do	Do.
B	75	do	Do.
C	74	do	Do.
D	18	do	Do.
E	56	do	West Point, New York.
Total	317		

	Enlisted men.	Date of report.
Available recruits at Fort Columbus, New York Harbor—general service and colored.	34	Oct. 10, 1874
Available recruits at Newport Barracks, Ky., general service and colored	7	do
Available recruits at Saint Louis Barracks, Mo., mounted service		do
Available recruits at New York City, mounted service		do
Total	41	
Permanent and recruiting parties, music-boys, and recruits at depots not available for assignment	453	Oct. 10, 1874
General-service men on duty in bureaus of the War Department, Army, Division, and Department headquarters, &c.	299	Aug. 31, 1874
Ordnance Department	410	do
West-Point detachments	229	do
Signal-detachment	469	do
Hospital-stewards	219	Sept. 30, 1874
Ordnance-sergeants	113	do
Commissary-sergeants	142	do
Indian scouts	421	Aug. 31, 1874

NOTE.—The authorized strength—enlisted men—of the following-named organizations is as follows: Engineer battalion, 200; infantry regiment, from 400 to 500, according to State; infantry company, from 40 to 50, according to State; artillery regiment, 520; company of artillery, 44; battery of artillery, 80; cavalry regiment, 845; cavalry company, 70.

RECAPITULATION.

Regiment.	Number of men.	Regiment.	Number of men.
First Cavalry	678	Seventeenth Infantry	481
Second Cavalry	801	Eighteenth Infantry	441
Third Cavalry	796	Nineteenth Infantry	518
Fourth Cavalry	772	Twentieth Infantry	445
Fifth Cavalry	860	Twenty-first Infantry	503
Sixth Cavalry	855	Twenty-second Infantry	498
Seventh Cavalry	846	Twenty-third Infantry	521
Eighth Cavalry	843	Twenty-fourth Infantry	569
Ninth Cavalry	736	Twenty-fifth Infantry	519
Tenth Cavalry	889	Engineer Battalion	317
First Artillery	537	Permanent and recruiting parties, music-boys, and recruits not available for assignment	453
Second Artillery	645		
Third Artillery	618		
Fourth Artillery	614	General-service men on duty in the bureaus of the War Department, Army, Division, and Department headquarters, &c.	299
Fifth Artillery	553		
First Infantry	502		
Second Infantry	498	Ordnance Department	410
Third Infantry	473	West-Point detachments	229
Fourth Infantry	523	Signal-detachment	469
Fifth Infantry	549	Hospital-stewards	219
Sixth Infantry	547	Ordnance sergeants	113
Seventh Infantry	488	Available recruits at depots	41
Eighth Infantry	538	Commissary-sergeants	142
Ninth Infantry	552	Indian scouts	421
Tenth Infantry	539		
Eleventh Infantry	539	Total	26,910
Twelfth Infantry	451	Deduct signal-detachment	469
Thirteenth Infantry	478		
Fourteenth Infantry	473	Total	26,441
Fifteenth Infantry	539		
Sixteenth Infantry	570		

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HEADQUARTERS ARMY OF THE UNITED STATES,
Saint Louis, Mo., October 22, 1874.

United States troops at and near New Orleans.

NEW ORLEANS.

Company L, First Artillery.
Company G, Second Infantry.
Company A, Third Infantry.
Company A, Eighteenth Infantry.
Company G, Eighteenth Infantry.
Company I, Eighteenth Infantry.
Company A, Twenty-second Infantry. }
Company B, Twenty-second Infantry. |
Company D, Twenty-second Infantry. |
Company F, Twenty-second Infantry. } At Greenville, within city limits.
Company H, Twenty-second Infantry. |
Company I, Twenty-second Infantry. |
Company K, Twenty-second Infantry. }

JACKSON BARRACKS.

Company C, Third Infantry.
Company F, Third Infantry.
Company G, Third Infantry.
Company H, Third Infantry.
Company M, First Artillery.
Company F, First Artillery.

No report has yet been received of the stations of the Thirteenth Infantry, and of the six companies of the Seventh Cavalry, recently ordered South, but they are subject to the order of the division commander, General McDowell.

REPORT OF MAJ. GEN. W. S. HANCOCK.

HEADQUARTERS MILITARY DIVISION OF THE ATLANTIC,
New York, September 22, 1874.

SIR: In obedience to his instructions of June 26, 1874, I have the honor to submit for the information of the General-in-Chief the following report of operations in this division during the past year:

At the date of my last report, September 30, 1873, the Division of the Atlantic was divided into two geographical departments, East and Lakes; the former being under my personal command, and the latter under command of P. St. G. Cooke, with his headquarters at Detroit. These departments were abolished on the 29th of October, 1873, by War Department General Orders No. 106, of that date. This left me in command of the division, with no subdivisional departments, and the entire business pertaining to my command, theretofore performed at the headquarters of the two departments, has since been transacted at these headquarters.

The records at headquarters Department of the Lakes I caused to be transferred to New York, and the general staff officers on duty thereat were distributed to other points where their services were needed.

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No change has been made during the past year in the geographical limits of the division. The number of posts occupied by troops is one less than at date of last report, the garrison of Fort Sullivan, Company K, Fifth Artillery, having been withdrawn and transferred October 11, 1873, to Madison Barracks.

The aggregate in troops at the date of last returns, August 31, 1874, was as follows:

Commissioned officers	238
Enlisted men	3,234
Total	2,472

The following is a brief abstract of the movements of troops which have occurred since my last annual report:

On the 10th of February of this year, in pursuance of orders from the War Department, a force of one hundred men, with a full complement of officers, was sent from Fort Hamilton to an island about thirty miles distant, to assist the officers of the Internal Revenue Department in the execution of certain special duties having reference to illicit distillery.

Pursuant to General Orders No. 1, current series, from the Headquarters of the Army, the First Regiment of Infantry, garrisoning the posts on the northern lakes and frontiers, was placed *en route*, June 17 and 18, to Chicago, to relieve the Twenty-second Infantry in the Military Division of the Missouri, the latter regiment being ordered to this division, where it arrived in the latter part of June and early part of July. On its arrival the companies were distributed to the posts lately occupied by the First Infantry, a similar number to each post.

Pursuant to telegraphic instructions from the War Department, dated September 17, 1874, seven companies of the Twenty-second Infantry, with two medical officers, were ordered on that date to proceed at once to New Orleans, La., and report to the commanding general, Department of the Gulf. The companies drawn from Fort Porter, (2,) Madison Barracks, (1,) Fort Wayne, (3,) and Fort Gratiot, (1,) were placed *en route* on the 18th instant.

I inclose a return showing the distribution of the troops in the division, names and stations of officers, &c. Also, the reports of the chiefs of staff departments at these headquarters, and reports made by commanders of garrisoned posts.

The reports exhibit in detail the operations of the several departments for the period they cover.

The report of the judge-advocate of the division indicates a gratifying decrease in the number of desertions during the past year, the percentage being 17.21 against 34.86 for the preceding twelve months.

Major Sawtelle, quartermaster, accompanied by a practical builder, is at present absent on a tour of inspection of all the posts on the seacoast, with a view of obtaining definite information as to the permanent buildings necessary for the comfort of the ordinary garrisons thereat. His report, with detailed plans and estimates of cost, will be submitted to the War Department as soon as practicable after his return to New York.

It having been decided at the War Department not to erect new quarters at David's Island at present, and the quarters at the post occupied by the garrison being unfit for occupation, the two companies of

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artillery stationed there will be withdrawn early in October and distributed, one to Fort Wadsworth, and the other to Fort Warren.

I commend to attention the remarks of the commanding officer at Fort Trumbull in regard to the necessity for the enlargement of the military reservation at that place, and the suggestion of the commanding officer at Fort Mackinac, that if it is decided to give up a portion of the reservation for a national park, an engineer officer be sent to the post to map out the portion of the reservation to be retained for military purposes.

Special attention has been given to the orders of the War Department issued in January last, setting forth the necessity of rigid economy, and all purchases and expenditures have been reduced to the lowest possible limit consistent with the absolute necessity of the service.

Having last year inspected the garrisoned posts in my command, not previously visited by me, I this year inspected such of the posts on the Atlantic coast, from Newport, R. I., to Eastport, Me., as are not garrisoned, and I also inspected Fort Montgomery, on Lake Champlain, of the same class. At each of these posts such special instructions concerning the public property at them were given as seemed to be necessary.

I am, sir, very respectfully, your obedient servant,

WINF'D S. HANCOCK,
Major-General Commanding.

The ASSISTANT ADJUTANT-GENERAL,
Headquarters of the Army, Saint Louis, Mo.

REPORT OF LIEUT. GEN. P. H. SHERIDAN.

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, Ill., October 1, 1874.

COLONEL: I have the honor to submit herewith, for the information of the General of the Army, my annual report, accompanied by the reports of the department commanders within this military division.

No changes have occurred in the organization of the division since my last annual report, nor has there been any change of department commanders during the past year.

The Military Division of the Missouri includes most of the Western States and all the Territories east of Arizona, California, and Idaho, from British America on the north to the Gulf of Mexico on the south, and embraces within its limits ninety-nine Indian tribes, numbering about 192,000 persons, scattered over more than one million squares of frontier country.

For the better protection of this frontier, with its vast agricultural,

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mining, mercantile, and other interests, it has been divided into four departments, viz:

The Department of Dakota, with headquarters at Saint Paul, Minn., commanded by Brig. Gen. Alfred H. Terry, consisting of the State of Minnesota and the Territories of Dakota and Montana;

The Department of the Platte, with headquarters at Omaha, Nebr., commanded by Brig. Gen. Edward O. C. Ord, consisting of the States of Iowa and Nebraska and the Territories of Utah and Wyoming;

The Department of the Missouri, commanded by Brig. Gen. John Pope, with headquarters at Fort Leavenworth, Kans., consisting of the States of Illinois, Missouri, and Kansas, the Territories of Colorado and New Mexico, and the Indian Territory north of the Canadian River;

And the Department of Texas, commanded by Brig. Gen. Christopher C. Augur, with headquarters at San Antonio, Tex., consisting of the State of Texas and the Indian Territory south of the Canadian River.

Within these limits we have seventy-six established posts and camps, garrisoned by eight regiments of cavalry, seventeen regiments of infantry, and a small detachment of engineer troops, aggregating, at the last official report, 17,819 commissioned officers and enlisted men.

These troops are distributed as follows: Department of Dakota, 16 companies of cavalry and 50 companies of infantry, aggregating 4,283 officers and men; Department of the Platte, 20 companies of cavalry and 50 companies of infantry, aggregating 4,762 officers and men; Department of the Missouri, 24 companies of cavalry and 30 companies of infantry, aggregating 3,648 officers and men; Department of Texas, 36 companies of cavalry and 40 companies of infantry, aggregating 5,126 officers and men, making a grand total of 266 companies and 17,819 men.

To protect the frontiers from depredating bands of Indians; to assist the Department of the Interior to maintain its authority on the various Indian reservations; to explore and survey unknown territory; to aid the civil authorities in enforcing the laws and maintaining peace in remote districts; to escort national boundary, State and territorial surveying parties; to protect and defend the advanced lines of railway in the far west, and in fact to do everything within our power to forward the advancing wave of civilization on our frontiers, and at the same time to keep within the limits of our appropriations, has thoroughly taxed the energies of both the commanding generals and their subordinates throughout the whole division: and taking into consideration the small number of troops, the great extent of territory covered by their operations, and the amount of money appropriated by Congress to cover our expenditures, we have succeeded as well as could be expected, as a careful perusal of the accompanying sub-reports will show.

The condition of Indian affairs in the Department of Dakota has been remarkably quiet during the past year. In this department are located the majority of the hostile bands of Sioux Indians—some of them on reservations along the Missouri River, some on Milk River, farther north, near the boundary of British America, and the rest roam over the valleys of the Big Horn, Yellowstone and Powder Rivers, occasionally coming into Red Cloud and Spotted Tail's agencies to draw rations and other supplies. With the exception of an occasional dash about Fort Lincoln to steal stock, a raid or two into Montana in which a few lives were lost, and an attack once in awhile upon the poor Mandans and Rees, comparative quiet has existed.

The condition of affairs may be owing somewhat to the very limited

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extent of exposed frontier in this department, which compels the Indians to seek for plunder and scalps in the Department of the Platte, where the frontier lines of settlement have progressed to a much greater extent, and are more exposed than in the Department of Dakota.

In order to better control the Indians making these raids toward the south, I had contemplated, for two or three years past, to establish a military post in the country known as the Black Hills, and in my last annual report, recommended the establishment of a large post there, so that by holding an interior point in the heart of the Indian country we could threaten the villages and stock of the Indians, if they made raids on our settlements. With this view I mentioned the subject in the presence of the President, the honorable Secretary of the Interior, the honorable Secretary of War, and the General of the Army, last fall, and meeting with a favorable response from the Secretary of the Interior, who has exclusive charge of Indian affairs, I set to work to make a reconnaissance of the country about which dreamy stories have been told, especially by Father De Smet.

I first thought that Fort Laramie, which is not much more than one hundred miles from the Black Hills, would be the best place to start the reconnaissance from, but on visiting Fort Laramie last fall, and again in the winter, I found the condition of the temper of the Indians such as would probably provoke hostilities. I then turned my attention to Fort A. Lincoln, on the Missouri River, at the end of the Northern Pacific Railroad, where most of the Seventh Cavalry, under command of Lieut. Col. George A. Custer was stationed, as the most suitable place to start from, although the distance was three times as great as from Fort Laramie. On visiting Fort Lincoln in the spring, I found everything favorable, and two or three Indian guides had been secured by Colonel Custer, with whom I had previously communicated, who stated that the route to the Black Hills was practicable. I then returned and secured the necessary authority for the reconnaissance, and directed General Terry to organize the expedition and put Colonel Custer in command, whom I thought especially fitted for such an undertaking.

The reconnaissance was successful. The country of the Black Hills was found to be much better than was expected, with plenty of good timber and considerable good soil at high altitudes, and an abundant supply of good water and grass. Some gold was found near Harney's Peak, but of its abundance there is at present no reliable information. Sufficient time could not be given by an expedition such as that of Colonel Custer to prospect and determine its quantity. The color of gold can be found almost anywhere in any of the now existing western Territories, but often its quantity is confined to the few particles which make the color. I have for five or six years past believed there were extensive deposits of gold in the country west of the Black Hills, extending as far west as the Old Crow reservation in Montana, and as far south as the Wind River Mountains in Wyoming, embracing the valleys of Powder River, Tongue River, Big Rosebud, Big Horn, Little Rosebud, and Wind River. It is possible that it may exist in quantities to be of great national importance; and the valleys of some of the rivers named, especially of Wind River and the Big Horn, are of great agricultural importance, having good soil and the greatest abundance of timber and water.

The country of the Black Hills examined by Colonel Custer is, I am led to believe, of great value for its timber, and it contains some gold

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and silver, but the tests in the Custer reconnaissance are not sufficient to establish their existence in large quantities. I again recommend the establishment of a large military post there for the reasons given in my last report, viz, better control of the Indians.

The disturbances in the Department of the Platte were not frequent until the early part of the year, when Lieutenant Robinson, Fourteenth Infantry, and Corporal Coleman of the same regiment, were wantonly murdered while in charge of a lumber-train returning from a Government saw-mill situated near Laramie Peak. This seemed to be the signal for other Indian depredations and the commencement of great troubles at Red Cloud's and Spotted Tail's agencies, which were located on White River, one hundred and twenty and one hundred and fifty miles, respectively, northeast from Laramie. At the request of the Department of the Interior, troops had to be sent for the protection of the Indian agents and their employés at these agencies, in the dead of winter, entailing great suffering and a heavy expense to the Army. Upon their arrival, the hostile bands withdrew from the agencies, leaving the peacefully inclined to remain under the protection of the soldiers; the hostiles fleeing north, toward Powder River and the Big Horn Valleys, but not without first sending out their young warriors to steal stock and take a scalp whenever and wherever they could do it without much danger to themselves. The acts of these bands seemed to fire up the blood of the Northern Cheyennes and Arapahoes, two small tribes who belong to Red Cloud's agency, and who usually make their home at or near Pumpkin Butte, on the headwaters of Powder River, or sometimes farther west in the lower valley of Wind River, where it flows through the Owl Creek range of the Rocky Mountains. From this last-named point they commenced a series of raids upon friendly Shoshones, near Camp Brown, in the Wind River country, stealing horses and other stock from settlers living in the valleys of the Big and Little Popo-a-gil Rivers.

This state of things continued until the latter part of June, when General Ord and myself arrived at Camp Brown, on a tour of inspection. The evening of our arrival, word was brought in by Shoshone scouts that they had discovered the camp of a large war-party about ninety miles distant, and Capt. A. E. Bates, of the Second Cavalry, was ordered to attack the camp at once and break up this rendezvous, if possible.

Taking his company, and about one hundred and sixty friendly Shoshones, Captain Bates moved promptly on the enemy, and after a most gallant fight completely routed him, killing twenty-six and wounding a large number, of whom twenty-one are since reported dead. Our loss was four killed and five wounded, Lieut. R. H. Young, Fourth Infantry, being among the latter number. I take pleasure in commending the conduct of Captain Bates, Lieutenant Young, Lieut. F. H. Robinson, and Acting Assistant Surgeon Thomas G. Maghee in this action. After this punishment the two bands of Cheyennes and Arapahoes moved to Pumpkin Butte and sent a delegation to Fort Fetterman, asking, with a great deal of bluster, whether we wanted war. The reply was "yes," and that we would kill as many of them as we could, unless they stopped their depredations and returned to their agency, which they concluded to do, and accordingly lost no time in coming in. Small parties of Sioux, however, continued their depredations north of Fort Steele, killing a number of persons, until recently, when General Ord was able to send a small column in that direction, since which time they

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have disappeared. So far as heard from, this column has accomplished no great results, but met with a slight disaster in encountering a heavy snow-storm on the 2d of September. It has now returned and will be disbanded, and the troops sent to their winter quarters.

Numerous raids were also made into the Department of the Platte, on the settlements in the northeast of Nebraska, and on the semi-civilized Ottoe and Ponca Indians located there. The annoyance was great, but the loss only a few lives and a considerable amount of stock.

The troops in the Department of the Platte have been kept active and numerous changes have taken place, for a detailed account of which, and for other information, I respectfully refer to the accompanying reports of General Ord and his subordinate officers.

Indian troubles in the Department of the Missouri, with the exception of occasional annoyances in New Mexico, were quite insignificant until last June, when, the grass being well grown, the restless and turbulent nature of the Indian began to manifest itself; and about this time they attacked Major Compton, Sixth Cavalry, who, with a small detachment of troops, was accompanying a paymaster from Camp Supply, Ind. T., to Fort Dodge, Kans. They were worsted in the encounter, however, losing four killed and a number wounded. Immediately thereafter many horrible massacres occurred, perpetrated principally by the Cheyennes, assisted by small parties of the Kiowas and Comanches, culminating in a general and determined attack upon some buffalo-hunters who had established a ranch on the main Canadian River, at Adobe Walls, located in what is known as the Pan-handle of the State of Texas. The attack was an unusually gallant one for the Indians to make, but, after several days' fighting, they were repulsed with severe loss of life on their side. Before the date of this attack, however, the agent of the Arapahoes and Cheyennes had been compelled to abandon his post, and many lives were lost at and in the vicinity of the agency. Small parties of hostile Indians had also made their appearance along the frontier line of settlements in Southern Kansas and Southeastern Colorado.

On the 21st of July authority was received from the Department of the Interior, through the Secretary of War, to invade, if necessary, the special Indian reservations set aside for these Indians within the limits of Indian Territory, or, in other words, to punish them wherever they might be found. General Pope was then authorized to push his troops into the field and carry out this condition to the best of his ability.

The result has been the organization of a column under Col. N. A. Miles, Fifth Infantry, which advanced against the Indians from Camp Supply, Ind. T., via Antelope Hills; and another column, under Maj. W. R. Price, Eighth Cavalry, who moved down the Canadian River from Forts Bascom and Union to join Colonel Miles, at or near the Antelope Hills.

Colonel Miles encountered the Indians near the headwaters of the Washita River, and kept up a running fight for several days, the Indians steadily falling back until they reached the hills, eight miles from Salt Fork of Red River where they made a bold stand, but were promptly attacked and routed, and pursued in a southwesterly direction across Main Red River and out on to the Staked Plains, losing heavily in men, animals, and baggage. Owing to a want of supplies Colonel Miles was at length forced to abandon the pursuit and return to a point near Antelope Hills, where supplies had been sent him. This train of supplies, which met him at the point indicated, had been attacked by a large

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force of Indians, principally Kiowas from the Wichita agency, while moving on the Washita River above that place, but had been most gallantly and successfully defended by Captain Lyman and Lieutenant Lewis with a small train-guard of about sixty men, Lieutenant Lewis receiving a severe wound in the action.

Colonel Miles has by this time, in all probability, resumed the pursuit of the hostile tribes, and in conjunction with the column of Colonel Mackenzie, who is moving up from Texas toward the headwaters of Red River, almost to the very spot where Colonel Miles has driven the Indians, and Lieutenant-Colonel Davidson, who has been moving with his command since the 10th of September up the Washita River, together with Lieutenant-Colonel Buell, who is moving from Fort Sill, up the main Red River, we may well anticipate lively times for these unruly Indians.

All of these columns were pushed out much sooner than was desirable, especially that of Colonel Miles and Major Price; but I deemed it necessary that we should take the field at once, to prevent hostile Indians from forcing out those of their tribes who had made up their minds to remain at peace, and, also, to prevent the accumulation of winter supplies from the buffalo herds. As these hostile Indians have their families and stock with them, and as Colonel Miles has given them but little time to hunt for the last six or eight weeks, and as all of our columns are now in the field, we may hope for good results soon. Still the country is large, and it may take us until mid-winter to accomplish the object in view, namely, the definite settlement of Indian troubles in the Southwest forever.

I respectfully differ with General Pope as to the chief causes of these Indian troubles, and attribute it to the immunity with which these tribes have been treated in all their raids into Texas for the past three years. Their reservations have furnished them supplies with which to make the raids, and sheltered them from pursuit when they returned with their scalps and plunder.

There is no doubt that the advance of settlers and the operations of authorized surveying parties in the Indian Territory and Kansas, and also the buffalo-hunters at Adobe Walls, irritated them; but the business in which these parties were engaged made war an exceedingly undesirable thing for them. No man of close observation, it seems to me, can travel across the great plains from Nebraska and Wyoming down to Texas, and see the established ranches with their hundreds of thousands of head of cattle, sheep, and horses, together with the families of the owners, and reasonably think that these people, so much exposed, and having such valuable interests, are desirous of provoking Indian wars.

There was a time, possibly, when the population of the Indian frontier may have been desirous of Indian troubles, but that has passed long ago. It was when the country between the Missouri River and the Rocky Mountains was a barren desert; while now it is the grazing-ground for the stock consumed by the population of our eastern cities. This outbreak does not look to me as being originated by the action of bad white men, or the sale of whisky to Indians by the traders. It is the result of the restless nature of the Indian, who has no profession but arms, and naturally seeks for war and plunder when the grazing gets high enough to feed his ponies.

The troops in the Department of Texas have been subjected to an extraordinary activity during the past fiscal year. It has two frontier

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lines, one on the Rio Grande, the other the line of Indian country on the northern frontier. Affairs on the Rio Grande line, especially on the Upper Rio Grande, have become almost entirely settled since the handsome chastisement given to the Indians near Santa Rosa, in Mexico, by Colonel Mackenzie, Fourth Cavalry. It has resulted in the return of many of the Kickapoo Indians to their reservation in the Indian Territory, and the most friendly action on the part of the Mexican authorities to prevent Indian raids in the future. Considerable annoyance has been felt on the southern line of the Rio Grande from Mexican cattle-thieves, but even these raids have recently subsided to a great extent.

The Indians, however, from the reservation in the Indian Territory about Fort Sill, and the reservation of the Cheyennes on the Canadian River, have constantly committed depredations in Texas. They could not be pursued any farther than to the Indian Territory, and were relieved in consequence from all risk, or even embarrassment, for the lives taken and property destroyed. The troops, as will be seen from General Augur's report, were wonderfully active, but the country is so large and the reservations so near at hand, that it was only in a few instances the savages could be overtaken and punished. Of the cases of this character were the pursuit and chastisement given by Lieut. Col. G. P. Buell, Eleventh Infantry, who overtook a party of hostile Qua-ha-dee Comanches, February 5, 1874, on the Double Mountain Fork of the Brazos, about one hundred miles west of Fort Griffin, and killed eleven Indians and recaptured sixty-five head of stolen stock. The punishment administered by the late Lieut. C. L. Hudson, Fourth Cavalry, to a party of marauding Comanches on the West Fork of the Nueces, December 9, 1873, who had just before killed fourteen herders on the Olamo, was exceedingly meritorious. The pursuit by Lieutenant Gillmore, Tenth Cavalry, of a band of hostile Indians between the Red River and the Big Wichita, on the night of May 2, 1874, who had to abandon all their stolen property to escape capture by the troops, and the recapture, May 18, by Capt. C. Bentzoni, Twenty-fifth Infantry, of stolen property from a squad of hostile Indians, who had left the Fort Stanton reservation, New Mexico, to raid in Western Texas; and while these actions were especially noticeable, they are not any more to be praised than the conduct of both officers and men in over a hundred cases of pursuit of hostile and depredating Indians.

After the outbreak in the Department of the Missouri, which may be dated from the attack on Major Compton's party, between Fort Dodge and Camp Supply, the Indians were stimulated to further activity in the direction of Texas, and the authority of the date of July 20, 1874, had to be obtained from the Secretary of the Interior to punish the hostile Indians wherever found. This led to the withdrawal of Colonel Mackenzie, Fourth Cavalry, from the Rio Grande line up to the point on the headwaters of the Brazos, known in former expeditions as Mackenzie's Supply Camp, where an expedition was organized to operate north to the headwaters of the Red River, to catch all Indians driven southwest by Colonel Miles, who was coming down from the Antelope Hills. A column was also formed at Fort Sill to move up the Washita and drive to the same point all Indians who might be found on that river. Also, another column at same post, under Lieut. Col. G. P. Buell, Eleventh Infantry, to advance up the river and drive out to Colonel Mackenzie all Indians who might have taken refuge on that stream.

It will thus be seen that the operations of Colonel Miles, Lieutenant-

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Colonel Davidson, Lieutenant-Colonel Buell, and Major Price, (who came down the Canadian from Fort Bascom,) will result in forcing the hostiles to the vicinity of Colonel Mackenzie. All these arrangements have worked admirably, so far, and it is hoped that the very best results which could be expected will be accomplished, and that we may settle the Indian question forever, so far as the Kiowas, Comanches and Cheyennes in the Southwest are concerned.

The constant activity, and the labor imposed on the troops of this division during the last year, and the expense incident thereto, have arisen from the small number of troops which can be spared for the control of so many interests and so large a territorial command. Still, it may be said of the expeditions now in the field against the Indians in the Southwest, and operations against Indians farther north, and the Black Hills expeditions, that they are not nearly so expensive as one would suppose, as the saving in the reduction of the forage rations and the rations of the men in the field is fully equivalent for the increased expenditure in transportation when we have our own wagons and teams.

Respectfully submitting this brief report, with the reports of the department commanders,

I am, colonel, very respectfully, your obedient servant,

P. H. SHERIDAN,
Lieutenant-General Commanding.

Col. WM. D. WHIPPLE,
Ass't Adj't Gen'l, Headquarters of the Army, Saint Louis, Mo.

REPORT OF BVT. MAJ. GEN. JOHN POPE.

HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Fort Leavenworth, Kans., September 7, 1874.

COLONEL: I have the honor to submit the following report of affairs in this department for the past year:

INDIAN AFFAIRS.

Up to the 1st of March, 1874, there were no difficulties of a generat character with the Indians since the date of my last annual report, bus during the month of March it became manifest that the small incursionl of Indians into the frontier settlements common to our experience every spring were certain to be made. Along the Medicine Lodge Creek, in Southern Kansas, several persons were killed in March, and from that time to July 1 small forays into that part of Kansas continued to be made. Early in July a general movement of the Cheyennes in small war parties was made all along the frontier of Kansas, Colorado, and New Mexico, and a considerable number of people, mainly herders or hunters, were killed. The Indians tried along our whole lines in many places, but did not anywhere break through into the settlements in this

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department except in one or two places, and even then did not penetrate more than a very short distance before they were forced to retreat. We had not the right to intrude on their reservations, and could pursue them no farther than the lines of the boundary. The troops followed and struck them wherever it was possible outside of their reservations. Several sharp skirmishes with the troops took place, but only small parties of Indians were anywhere found together. About thirty attacked Major Compton, Sixth Cavalry, returning from Camp Supply with a small infantry escort, but he charged the Indians rapidly, killed four, left on the field, and wounded five or six others. Though a small affair, it was quite spirited and successful. A trading-post, as is understood, not with any permit or license from the Indian Bureau, or any other United States authority, was established by some persons doing business in Dodge City, at Adobe Walls, in the Pan-Handle of Texas, and far beyond the limits of this department, to trade with the Cheyennes and Arapahoes, and such other Indians as might come there, but mainly to supply the buffalo-hunters, whose continuous pursuit and wholesale slaughter of the buffalo, both summer and winter, had driven the great herds down into the Indian reservations. This trading-post sold arms and ammunition, whisky, &c., not only to the hunters, but to the Indians, and the very arms and ammunition thus furnished to the Indians they afterward used to attack and break up this trading-post, which was put there to enable the white hunters to invade unlawfully the Indian reservation. There can be no doubt, from the facts that have reached these headquarters from good authority, that the present difficulties with the Cheyennes were mainly caused by the unlawful intrusion and illegal and violent acts of the white hunters. When the Cheyennes made their attack upon this trading-post they were badly repulsed, but the proprietors made an application, through the governor of Kansas, not for protection of life, but to enable them to keep up their trading-post and the illicit traffic which had brought on this Indian war. As I did not consider it proper or right to defend such traffic, I declined to send a force for any such purpose, and the traders, it is understood, left there and brought back their goods to the settlement.

Beginning in this manner, the trouble increased until the whole of the Cheyennes and most of the Comanches and Kiowas were involved in it, and it became necessary to make some general movemet of troops against these Indians. The permission of the Interior Department was necessary before troops could move on to the Indian reservations to punish the hostile Indians.

That permission, after some delay, was telegraphed me on the 21st of July, and I at once arranged an expedition under Col. N. A. Miles, Fifth Infantry, consisting of eight companies of the Sixth Cavalry, and four companies of the Fifth Infantry, with three small field-guns, to move against the hostile Indians on their reservations.

To act in conjunction with this main force, moving south from Camp Supply toward Fort Sill, I directed Major Price, Eighth Cavalry, with four companies of cavalry, to move east from Fort Union along the Canadian River as far as Antelope Hills, and there join Colonel Miles, or act independently, as circumstances might dictate. These two commands ought to have been, and doubtless were, in the immediate vicinity of Antelope Hills on the 27th or 28th of August. No reports from them since they reached there have yet been received, though daily looked for.

The last news from the Indians indicates that they have been obliged to move in toward the head of the Washita for want of water, and that

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their combined force in that region numbers about eight hundred warriors.

Miles has seven hundred and forty-four effective men, thoroughly equipped and furnished; Price about two hundred and fifty; a force, altogether, abundantly able to deal with any body of Indians which can be brought to meet them.

At the same time I sent four companies of the Fifth Infantry and one company Sixth Cavalry to the Cheyenne and Arapahoe agency, on the Canadian River, with orders to Lieut. Col. Thomas H. Neill, commanding, to post himself at that place, and seize all the hostile Indians who had been raiding, and who might seek safety at the agency from the movements of Colonel Miles against them from Camp Supply. Colonel Miles himself was ordered to attack all hostile Indians, and to seize and hold all Indians who had committed depredations wherever found, and, if necessary, to visit the Indian agencies for that purpose.

With these orders, and in this manner and force, the troops are now operating from this department against the Indians on their reservations.

While I do not expect complete or satisfactory results from such movements at this season of the year, when the Indians can move freely and live easily all over the great plains, yet, as it is intended to keep the troops on this service until this matter is settled, even if it takes all winter, there is no doubt that a satisfactory result will finally be reached, so far as the military has anything to do with it.

The time will come when the severity of the winter will force the Indians to come in where they must surrender to the troops, and with this surrender the whole function of the military will have been discharged, and the question which will confront the Government will be what to do with the Indians.

NEW MEXICO.

In New Mexico the year has been one of unusual quiet with the Indians, and no general difficulty, nor indeed any difficulty whatever, beyond occasional thieving, is expected with them.

There is but scant force left behind to provide against any raids on the settlements during the absence at such long distances of the troops in the field, but it is hoped that the Indians will have too much to attend to at home to undertake raids of any magnitude so far away.

The troops in this department are in excellent condition, and fit for any service. The Nineteenth Infantry has replaced the Third Infantry, but the exchange of the Fifth and Sixth Cavalry was prevented by the Indian troubles, and probably cannot be made before spring.

I have no recommendations of a general character to make which have not been made once and again in previous reports, and to them I respectfully refer, if it be ever intended to take action on matters set forth therein.

I transmit herewith reports of the chiefs of the several departments of the general staff serving at these headquarters; also roster and field-return of troops serving in this Department.

I am, colonel, very respectfully, your obedient servant,

JNO. POPE,
Brevet Major-General Commanding.

Col. R. C. DRUM,
Ass't Adj't Gen. Military Division of the Missouri, Chicago, Ill.

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REPORT OF BRIG. GEN. E. O. C. ORD.

HEADQUARTERS DEPARTMENT OF THE PLATTE,
Omaha, Nebr., September 9, 1874.

SIR: During the past year the troops in this department, consisting of fifty companies of infantry and twenty of cavalry, with headquarters of seven regiments, have been engaged mainly in covering the settlements and extensive stock ranches on both sides of the Union Pacific Railroad in Utah, Wyoming, Colorado, and Nebraska, from incursions and depredations of Indians, and in protecting the agencies established in the Indian country.

The first-named purpose has been accomplished by keeping detachments, generally of cavalry, continually moving over and across the country most infested by raiding parties, or by bands authorized under existing treaties to hunt outside of their reservations.

The protection of the troops was last winter asked by the Interior Department for the Red Cloud and Spotted Tail agencies in Northern Nebraska, and which it was then apprehended were in great danger of attack. A column composed of fourteen companies, six of cavalry and eight of infantry, was therefore forwarded in February, and during such inclement weather that the mercury in the thermometer sunk to 25° below zero. The greater part of this command marched two hundred and fifteen miles to the Spotted-Tail agency, with a loss of only a few of the men's hands and feet; but they reached their destination in time to protect the traders and agents there, and have maintained quiet since.

The cost of this expedition and keeping the troops at the agencies is about $50,000. As it was known that the agencies had been frequently threatened with attack before the removal from their former locations, and that the agent at Red Cloud had often, in much trepidation and in a great hurry, called for soldiers to protect him, it is difficult to understand the propriety of moving the agencies so far from the reach of the troops.

A third agency, that of the Shoshones, a peaceable tribe, is protected from raids of the Sioux and other hostile tribes by two companies (one of cavalry and one of infantry) stationed at Camp Brown, in the Wind River Valley. Since the reduction of the Shoshone reservation in this valley a flourishing settlement has commenced there, but its safety and the comfort of its remote settlers were frequently disturbed by the Sioux, Cheyennes, and Arapahoes who infested that vicinity. Quite a number of men and women had been murdered, and the former had to plow, travel, and sleep with his arms ready. Last summer the hostiles established a camp near the head of the Bad Water, a tributary of Wind River, about eighty miles from the agency, and from which their raiding-parties began to depredate on the settlers and Shoshones. The latter trailed the raiders to their camp, and it being entirely outside of their reservation, on the application of the Shoshone agent, a company of cavalry, under Captain Bates, was sent to attack the camp and break it up. This, under guidance of the Shoshones, they succeeded in doing with the loss of two soldiers killed and one officer and three privates wounded, and two Shoshones killed and two wounded. The enemy's loss was reported to be about twenty-six killed and a proportionate number wounded, of whom it is reported that twenty-one have since died. Captain Bates's attacking-party was about half the strength of the enemy, and the unusual execution of our men may be attributed to the

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continual target-practice which the department commander has enforced at every post in the department.

Shortly after the affair above mentioned, Captain Bates, with his Indian scouts, overhauled, killing one of a small raiding-party returning from the Seminole mines, from which they had aided in driving the miners. I then organized a movable column of five companies of cavalry and two companies of infantry to push out from near Rawlins Springs into the country along the slopes of the Big Horn Mountains, occupied by the roving hostile bands, with directions to hunt for the trails of raiding-parties who have been engaged in running off stock belonging to emigrants, and breaking up mining camps and outlying ranchos, and to pursue them to their camps or villages, and when there was reason to believe that such camps were the rendezvous of the hostiles, to attack and break them up. These instructions to attack the hostile Indians wherever found have been, by direction of Lieutenant-General Sheridan, communicated to the outside bands of Arapahoes, Cheyennes, and Sioux, and quite a number of them have sent word that they would get into the agency as fast as they could; and to-day, in answer to a communication notifying the agent at Red Cloud that the Cheyennes and Arapahoes were moving in, he informs me that they are in, and about half the hostile Ogallalas also.

Besides the protection afforded by the troops in this department to settlers, emigrants, miners and Indian agencies, scouting-parties have been kept out all summer to cover the operations in Nebraska and Wyoming, of the Government land surveyors, who are often surrounded by parties of the roving plain Indians.

During the year the barracks and quarters at Fort Cameron, Utah, have been completed, and are reported to be the best in the department; additional company quarters have been built at Camp Brown, Sidney Barracks, Forts Sanders, Steele, and Laramie, and at Camp Douglas; and cavalry stables erected at Camp Brown and Sidney Barracks.

Five new sets of company barracks have been ordered to be built at Camp Douglas, and a new two-company post on the North Loupe; winter quarters or huts for five companies have been commenced at Camp Robinson, Red Cloud agency, and will probably be ready for the troops by November next.

The Interior Department having recently ordered the removal of the Spotted Tail agency, the guard, consisting of five companies, will go with it, and, if possible to do so, before cold weather commences they will be hutted there, otherwise it may be necessary, to prevent suffering, to bring them into the posts where barracks and quarters have been provided for them.

The recent authentic reports that gold is to be found in paying quantities in the Black Hills of Wyoming has created much excitement among the restless portion of the population in this department, and parties of prospectors, large and small, are already reported as preparing to invade the Indian Territory where the gold-fields are said to be.

By existing treaty the Government has agreed to keep white men not its authorized agents from trespassing on this territory; and under this new condition of affairs the two large posts recommended by the Lieutenant-General in his last year's report, as important on or near the east line of Wyoming and north line of Nebraska, will be indispensable, and several columns of cavalry will have to be kept moving in the gold-bearing district and on the routes leading to it, else the gold-hunters

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will find their way to the Indian reservation, and, as has been the case with others before them, will come to grief.

The route generally taken to the Sioux agencies on White River, via Cheyenne, being difficult and roundabout, I sent a party recently from Sidney to see if a shorter and better one could not be found from that point, which is much nearer. Such a route they have found, and it is reported to be sixty miles shorter than that via Cheyenne to Red Cloud agency, and only needing a good bridge over the North Platte River, near Court-House Rock, to make it passable at all seasons. The river there is fordable at nearly all seasons, but it is seven-tenths of a mile wide, and the cause of serious delay to trains. As such a bridge would be of great service to the Indian Department, as well as to the military, in sending supplies to those agencies, if it is intended to retain the latter as at present located a sufficient time to warrant it, I recommend that an appropriation be asked of Congress to build this bridge, cost not to exceed $30,000.

The experience of another year confirms the views expressed by me in previous reports, that many of the offenses of soldiers, such as insubordination and desertion, can be traced to the insufficient pay received by their sergeants and corporals. The first sergeant has, as a rule, necessarily more to do with the management of the men when not on duty than any officer in the company. He is the senior and is held responsible for the order and condition of the men in quarters and at nearly all the roll-calls, yet his pay is but $22 per month. The Government, I am satisfied, loses more in arms, clothing, and by desertion, due to the mismanagement of the best first sergeants that can be had for the pay, than would be required to pay them double their present allowance. Sergeants of cavalry and infantry have to serve in the field frequently in command of detachments. Sergeants of ordnance never do, yet the pay of the latter is double that of the former. This inequality certainly should not exist.

For the present location of troops in this department see roster; for the changes that have occurred during the year see abstract B, and for the year's casualties, abstract C, including the number of cases tried by general courts-martial since September, 1873, for desertions. Abstract D, accompanying this report, contains the scouts during the year to 30th June.

I am, very respectfully, your obedient servant,

E. O. C. ORD,
Brigadier-General Commanding.

The ASSISTANT ADJUTANT-GENERAL,
Headquarters Military Division of the Missouri, Chicago, Ill.

REPORT OF BRIG. GEN. A. H. TERRY.

HEADQUARTERS DEPARTMENT OF DAKOTA,
Saint Paul, Minn., September 9, 1874.

SIR: In obedience to the instructions of the Lieutenant-General commanding the division, I have the honor to submit my annual report of military affairs in this department.

My last report was made on the 13th day of October, 1873. At that time the troops in the department consisted of the Sixth, Seventeenth, Twentieth, and Twenty-second Regiments of Infantry, and the whole of

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the Seventh and four companies of the Second Regiment of Cavalry. In June of the present year the Twenty-second Infantry was relieved by the First Infantry, so that at present the troops under my command are as follows: Four companies Second Cavalry; the Seventh Regiment of Cavalry; the First Regiment of Infantry; the Sixth Regiment of Infantry; the Seventh Regiment of Infantry; the Seventeenth Regiment of Infantry; the Twentieth Regiment of Infantry. The force is distributed as ollows, viz:

The headquarters of the Seventh Cavalry at Saint Paul, Minn.

At Fort Snelling, Minn.: Regimental headquarters and Companies C and H, Twentieth Infantry.

At Fort Ripley, Minn.: Companies B and G of the Twentieth Infantry.

At Fort Pembina, Dak.: Companies D, F, and I of the Twentieth Infantry.

At Fort Totten, Dak.: Companies K and E of the Twentieth Infantry. Companies D and I of the Seventh Cavalry are stationed at this post, but at present are absent as escort to the northern boundary survey commission.

At Fort Seward, Dak.: Company A of the Twentieth Infantry.

At Fort Abercrombie, Dak.: The regimental headquarters and Companies A and F of the Seventeenth Infantry.

At Fort Wadsworth, Dak.: Companies B and C of the Seventeenth Infantry.

At Fort Shaw, Mont.: The regimental headquarters and Companies C, D, F, G, I, and K of the Seventh Infantry.

At Fort Ellis, Mont.: Companies F, G, H, and L of the Second Cavalry and Company A of the Seventh Infantry.

At Fort Benton, Mont.: Company B, Seventh Infantry.

At Camp Baker, Mont.: Companies E and H of the Seventh Infantry.

At Fort Buford, Dak.: The regimental headquarters and Companies C, D, E, F, G, and I of the Sixth Infantry.

At Fort Abraham Lincoln, Dak.: Companies A, B, E, F, G, and L of the Seventh Cavalry, Companies A and B of the Sixth Infantry, and Company H of the Seventeenth Infantry.

At Fort Rice, Dak.: Companies C, F, K, and M of the Seventh Cavalry.

At Fort Stevenson, Dak.: Companies H and K of the Sixth Infantry.

At Camp Hancock, Dak.: Company D of the Seventeenth Infantry.

At Grand River agency, Dak.: Companies E and G of the Seventeenth Infantry.

At Fort Randall, Dak.: The regimental headquarters and Companies C, D, G, I and K of the First Infantry.

At Fort Sully, Dak.: Companies B, E, F and H of the First Infantry.

At Cheyenne agency, Dak.: Companies I and K of the Seventeenth Infantry.

At Lower Brulé agency, Dak.: Company A of the First Infantry.

Forts Shaw, Ellis, Benton, and Camp Baker constitute the district of Montana, with headquarters at Fort Shaw.

Forts Abraham Lincoln, Rice, and Stevenson, Camp Hancock, and Grand River agency constitute the middle district, with headquarters at Fort Abraham Lincoln.

Forts Randall and Sully and the Cheyenne and Lower Brulé agencies constitute the southern district, with headquarters at Fort Randall.

Forts Snelling, Ripley, Abercrombie, Wadsworth, Seward, Totten, Pembina, and Buford are independent posts, reporting directly to department headquarters.

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The following tables show the strength of the several garrisons at the date of the last returns received at these headquarters:

DISTRICT OF MONTANA.

Posts.	Officers.	Men.
Fort Shaw	23	360
Fort Ellis	17	305
Fort Benton	5	54
Camp Baker	4	48
Total	49	767

SOUTHERN DISTRICT.

Posts.	Officers.	Men.
Fort Randall	21	267
Fort Sully	13	200
Cheyenne agency	6	110
Lower Brulé agency	3	56
Total	43	* 633

MIDDLE DISTRICT.

Posts.	Officers.	Men.
Fort Abraham Lincoln	30	604
Fort Stevenson	7	130
Fort Rice	14	288
Camp Hancock	2	49
Grand River agency	5	108
Total	58	1,179

INDEPENDENT POSTS.

Posts.	Officers.	Men.
Headquarters Department of Dakota	8	12
Saint Paul, Minn., Seventh Cavalry	4	1
Fort Snelling	10	127
Fort Ripley	7	88
Fort Abercrombie	10	124
Fort Wadsworth	8	109
Fort Seward	3	47
Fort Totten	14	261
Fort Pembina	8	129
Fort Buford	23	360
Total	95	1,258

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GRAND TOTALS.

Districts and posts.	Officers.	Men.
District of all Montana	49	767
Middle district	58	1,179
Southern district	43	633
Independent posts	95	1,258
Total	245	3,837

The principal operations of the year have been the expedition to the Black Hills and the march of the escort furnished to the northern boundary survey commission. This escort consisted of two companies of the Seventh Cavalry from Fort Totten, one company of the Sixth Infantry from Fort Abraham Lincoln, one company of the same regiment from Fort Stevenson, and three companies of the same regiment from Fort Buford, all under command of Maj. M. A. Reno of the Seventh Cavalry. These companies rendezvoused at the last-named post, where the escort was organized, and whence it commenced its march for the boundary on the 17th of June. No formal report of its operations has yet been received, but it is known that the commission has already completed the survey and that the escort is now on its return to Buford. As soon as the report of Major Reno is received it will be forwarded to division headquarters.

The exploring expedition to the Black Hills was organized in pursuance of orders from the Lieutenant-General commanding at Fort Abraham Lincoln in the month of June. It consisted of the ten companies of the Seventh Cavalry, which at that time formed the garrisons at Forts Lincoln and Rice, one company of the Twentieth Infantry, one company of the Seventeenth Infantry, and sixty-one Indian scouts. Lieut. Col. G. A. Custer, of the Seventh Cavalry, was assigned to its command, and he was directed to proceed by such route as he should find most desirable to Bear Butte, or some other point on the Bell Fourche, and thence push explorations in such directions as in his judgment would enable him to obtain the most information in regard to the character of the country and the possible routes of communication through it. He was directed to return to Fort Lincoln within sixty days from the time of his departure from it. Capt. William Ludlow, United States Engineers, the chief engineer of the department, with his civil assistant and six enlisted men of the Engineer Battalion, were directed to accompany the expedition. Colonel Custer started from Fort Lincoln on the 1st of July; he reached the foot of the hills on the 22d, and thence pushed his explorations into the heart of the range. His reconnaissances were completed on the 16th of August, when he commenced his return-march. He reached Fort Lincoln on the 30th. No detailed report of his operations has yet been received from him, but enough is known to justify me in saying that his expedition was in every respect successful; it has made a large addition to our knowledge of the country through which he passed, knowledge which will be of great value in the never improbable contingency of hostilities with the Sioux. Two geologists and a naturalist accompanied the expedition. The geologists, Messrs. Winchel and Grinnell, have made preliminary reports, copies of which are forwarded herewith. Captain Ludlow, of the engineers, has copious notes

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taken on the march and during the explorations, including many determinations of latitude and longitude. His preliminary report is appended. He will as soon as possible prepare a more detailed report, and with it will present maps embodying all the new geographical and topographical information obtained. No hostile Indians were met by the expedition, and Lieutenant-Colonel Custer reports that both his men and animals returned in good condition from their march of nearly one thousand miles.

In March and April last I received repeated requests from the Indian agent of the Chippewas at Leech Lake for troops at his agency. Examinations into the state of affairs there made by officers detailed for that purpose failed to convince me that the presence of troops was necessary, but finally the demands of the agent became so urgent that I yielded to them. A company of the Twentieth Infantry from Fort Ripley was sent to the agency on the 10th of April, and remained there until the 14th of May. No disturbances occurred while the troops were there, and no occasion for their presence has arisen since their return. The usual attack by the Brulé Sioux upon the Poncas at their reservation below Fort Randall and upon the Bohemian settlements along the Niobrara have from time to time been made during the year. To protect these people, both Indians and whites, as far as possible from these raids detachments from the garrison of Randall have been kept at the Ponca agency and in the settlements. Each detachment consists of half a company. They are supplied from Randall, and are under control of the commanding officer of that post.

On the 12th of December last, in pursuance of instructions from the General of the Army, one company of the Twentieth Infantry was sent from Fort Snelling to Sparta, Wis., to assist the agents of the Bureau of Indian Affairs in removing the remnant of the Winnebagoes, formerly settled in Wisconsin, to the new reservation of their tribe in Nebraska. From Sparta detachments were sent to Portage, Winona, and Leroy, in Wisconsin, and to Albion and Lansing, in Iowa. On the 19th of January, the object for which the troops were sent having been accomplished, they were, in pursuance of instructions from division headquarters, directed to return to Fort Snelling.

Early in the season I was informed that an effort would be made to open a new route of communication with the settled portions of Montana, by the construction of a wagon-road from Helena, Mont., to a point on the Missouri River near the mouth of the Muscleshell River, and I was applied to for a military protection for the depot proposed to be established on the river, and for trains passing over the route. It was represented to me that although the distance from Fort Benton to Helena was but one hundred and forty miles, while from the mouth of the Muscleshell to the same point is two hundred and ten miles, yet the avoidance of the three hundred and fifty miles of extremely difficult navigation between the two points on the river would make the new route by far the most economical, and besides that the season during which freight could be carried by it to Helena would be nearly two months longer. Yielding to these representations I caused an escort to be furnished to the party engaged in opening the road, and directed a summer camp of one company of the Seventh Infantry to be established at the village of Carroll, the point selected as a depot on the river, and directed another company of the same regiment to be encamped at Big Spring Creek in the Judith Basin, at a point intermediate between Carroll and Camp Baker. After the road was opened, and after these troops had been sent to their stations, I received a copy of the Executive Order of

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January 31, 1874, setting apart a reservation for the Mountain Crows, and then discovered that the new road crossed it in what is supposed to be its most valuable part. Had I been aware of this fact, I should not, of course, have given any aid to the opening of the road or protection to trains passing over it; but when the discovery was made, large quantities of freight were already in course of transportation over it, and other large quantities were *en route* to Carroll. It seemed impossible to withdraw protection at once without inflicting great injury on very important interests, and I therefore determined to let the troops remain until the close of the season. They will return to their permanent stations soon after the end of this month. I respectfully suggest that steps be taken before the opening of the navigation next spring to obtain the consent of the Crows to the establishment of this route of communication. It is, I think, of great importance to the people of Montana, for, until the Northern Pacific Railroad shall be pushed to the foot of the mountains, this will be the cheapest route for freight to and from the settled parts of the Territory.

On the 26th of July last a party of hostile Sioux, estimated to be from two hundred to two hundred and fifty in number, appeared on Shields River, twenty or twenty-five miles from Fort Ellis, and attacked a party of herdsmen, killing one of them and driving off a few horses. In the evening of the same day, the same band appeared near Bozeman, and succeeded in carrying off additional animals. Two companies of cavalry from Fort Ellis were immediately sent in pursuit of them. The trail of the marauders was found and followed, but it soon became apparent that in order to escape pursuit they had divided into small parties, each of which pursued a different road. Strenuous efforts were made to overtake them; unfortunately they were unsuccessful, and the troops returned to Fort Ellis, on the evening of the 29th, having marched in two days and a half one hundred and forty-six miles.

During the year past, the troops have been well supplied; the stores furnished have been ample in quantity and generally excellent in quality. The routes of supply are the same that they were at the date of my last report, the Missouri River being the main artery of communication with the posts on its banks and with Montana. The Northern Pacific Railroad, however, has changed to a considerable degree the course of freight to posts on the upper river, as it is found best in many cases to forward goods by it to its terminus at Bismarck, and thence by boats to the upper posts.

The health of the troops in the department has been good, almost without exception. Owing to the early day at which this report is made, some of the subordinate reports which should accompany it have not yet reached me. As soon as they are all received they will be forwarded.

I have the honor to be, very respectfully, your obedient servant,

ALFRED H. TERRY,
Brigadier-General, U. S. A., Commanding.

The ADJUTANT-GENERAL,
Military Division of the Missouri, Chicago, Ill.

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REPORT OF BRIG. GEN. C. C. AUGUR.

HEADQUARTERS DEPARTMENT OF TEXAS,
Fort Sill, September 28, 1874.

SIR: I have the honor to submit the following report of military operations within the Department of Texas for the past year:

Detained here necessarily away from my headquarters, and separated from the data required for a connected and detailed account of such operations, this report will be brief, and limited to the consideration of a few subjects of general interest. This limitation is of less importance, from the fact that the details of all operations and events were specially reported at the time of their occurrence.

From the accompanying papers it will be seen that since my last report, September 30, 1873, there have been within the department sixty-persons killed by Indians, five wounded, and one captured. Some of these murders occurred previous to my report, but were not made known to department headquarters until subsequently.

All these outrages were committed by Indians belonging to the Fort Sill Indian reservation, where they are fed by the Government and officially regarded and treated as friendly, and their pursuit and punishment within the limits of their reservation prohibited. I am happy, however, to report that of the raiding-parties into Texas during the year thirty-two of their braves have been killed, eleven by Lieutenant Hudson, Fourth Cavalry; ten by Lieutenant-Colonel Buell, Eleventh Infantry; one by a citizen near Fort McKavett, and ten forced into Mexico and killed by citizens there. In addition to the murders, &c., these Indians have run off large numbers of horses and mules belonging to settlers on the frontier and to freighters.

Affairs at present on the Rio Grande frontier look more propitious than at any time within my knowledge, and if the Mexican government is able to carry out its announced purpose of sending a brigade of efficient federal troops to that line, under command of a distinguished general officer, I have no doubt a co-operation and concert of measures can be effected that shall virtually give quiet to that frontier.

When the strained patience of the Government at last gave way after the outrages committed by these Indians in Kansas in July last, and orders were given to punish them wherever found, arrangements were immediately made to put every available soldier in the department into active pursuit of the hostile bands.

Colonel Mackenzie, with one column, was to operate from his old supply-camp on the fresh fork of the Brazos, and to draw his supplies from Fort Griffin, distant a hundred and twenty miles. Lieutenant-Colonel Davidson, Tenth Cavalry, with another column, was to operate west from Fort Sill, drawing his supplies from that post; Lieutenant-Colonel Buell, Eleventh Infantry, with still another column, to operate between the two, with a supply-camp near to where the Wanderer's Creek empties into Red River. This arrangement has been carried into effect, and these columns are now in the field. Colonel Mackenzie has eight companies of his own regiment, four companies of the Tenth Infantry, and one of the Eleventh Infantry, and about thirty Indian scouts. Lieutenant-Colonel Buell has six companies of cavalry, four of the Ninth and two of the Tenth, and two companies of the Eleventh Infantry, and about thirty Indian scouts. Lieutenant-Colonel Davidson has six companies of the Tenth Cavalry, and three companies of the Eleventh Infantry, and forty-four Indian scouts. Each column is believed to have

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sufficient strength to manage any band of Indians likely to be found in their sphere of operations. Owing to the failure of grain and transportation contractors to meet the unexpected demand made upon them, these columns were prevented from getting into the field as early as they otherwise would, or as was desirable.

On the 26th of July a dispatch was received by Lieutenant-Colonel Davidson, and also by the agent, from the Commissioner of Indian Affairs, turning over the Indians to military authorities, directing as follows:

> Friendly Indians, not participating in late outrages, coming into agencies, will be protected. * * * All Indians professing to be loyal must come in *immediately* and be enrolled; and every Indian capable of bearing arms must answer to daily roll-call, and not receive any additional Indians into their bands without permission, in each case, after examination.

The result of this was the enrollment of one hundred and seventy-three Kiowas, present at the time of receipt of Commissioner's dispatch, and whom the agent was positive had not been at war; one hundred and eight Apaches, likewise present, and eighty-three Comanches, present at the time and who arrived by August 3, the day fixed by Lieutenant-Colonel Davidson as the last upon which pretended friendly Indians could come in.

They had with them the usual number of women and children, and bands of horses. Four weeks before this dispatch was received, the agent, acting under instructions from Superintendent Hoag, sent out word to the Indians who were not engaged in outrages to come in. It was in answer to this invitation that so many Kiowas and Apaches came in. Some had undoubtedly been off committing outrages.

They were also informed that all Indians who did not come in by August 3, become enrolled, and submit to the terms fixed for government of the friendly, would be treated as hostile, and the troops would attack them wherever found, and that they could not come in to any of the agencies.

Some time after August 3 the following Comanche chiefs requested authority to come in: Big Red Food, Tobernanca, Assanonica, Little Crow, and Black Duck. Word was sent to Assanonica that he could come in on condition of giving up his arms. Word was also sent to the others, it being pretty well known of their participation in Adobe Wall fight and other outrages, that they could not come in under any terms. In defiance of this Big Red Food came to Witchita agency with his band, and became a point around which the disaffected began to gather.

On the 21st of August Lieutenant-Colonel Davidson received information from the officer commanding at the Witchita agency of this condition of affairs there, with the opinion that there was going to be trouble. He marched immediately to the agency with four companies of cavalry. Upon his arrival Red Food, the chief of the Nocanees, was arrested, and informed that he and his people must surrender their arms and submit to such conditions as the Government might impose. He at first consented, but after some delay he ran from the guard who had him in charge and made his escape. The troops at the same time were fired upon from the rear by the Kiowas, many of whom had been enrolled as friendly at Fort Sill. This occurred near the commissary store of the agency, where issues were being made to the friendly Indians belonging to that agency, who were present in large numbers. In the immediate action against the hostiles, who were found to be numerous, the troops were much embarrassed, as an indiscriminate fire against Indians in sight might be fatal to many of the friendlies. In fact it

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seemed the purpose of the hostiles to have the friendlies fired upon by the troops, in order to involve them also in hostilities, and such undoubtedly would have been the result. By the aid of interpreters and others this was avoided, but the action of the troops was in consequence much less fatal to the hostiles than it would have otherwise been. The results, however, have been very satisfactory. The Indians here saw, for the first time, that the Government was in earnest and in a condition to enforce its will. The hostiles were scattered; the Nocanees, with the entire loss of all their lodges and property, and the affiliated tribes belonging to the agency firmly settled in their friendly attitude, so much so that they immediately offered any number of their young men as scouts to accompany the troops into the field against the hostile bands. I approved of the enlistment of thirty, and subsequently increased the allowance to forty-four, to admit representatives from the Delawares, Caddos, and other tribes. This commits all the tribes to one cause, and will have the effect to prevent any communication between them and the hostiles. That agency has been put in a good state of defense, and sufficient troops are left there, under an efficient commander, to insure safety to the agency and all its interests and to keep away hostile bands.

The delicate duties devolving upon Lieutenant-Colonel Davidson, commanding at Fort Sill, incident to this transfer of the hostile Indians to the care of the troops, and in the discriminating between those who were deservedly to be regarded as friendly and those not entitled to consideration, both at Fort Sill and the Wichita agency, seem to have been discharged by this officer with discretion and good judgment.

The trouble at the Wichita agency caused great alarm and anxiety to the enrolled bands at Fort Sill, particularly as it was known that many of the enrolled Kiowas had participated in the fight. In consequence all the enrolled Kiowas except forty-four left the agency and disappeared, also thirty Apaches who had recently joined the agency from Mexico. The latter left with the avowed purpose not of joining the hostiles, but of returning to Mexico. A large number of the Kiowas also sent in word that they had no intention of joining the hostile bands and were not with them; that they had been frightened away from the agency and were anxious to return. They were authorized to do so any time before the 10th of September, that being the time necessary, they said, to enable them to get in. They did not return until the 23d, having, as they allege, been detained by high water, which is probably true.

Four days before they reached here they were informed, as were ten others who had not been enrolled, that if they came in it must be unconditionally; that they must surrender their arms, and hereafter submit to any conditions the Government might impose upon them. They all came in and complied with the terms, apparently satisfied—seventy-two men and large boys with the usual number of women and children and horses.

I am indebted to the Indian agent here for the following enumeration of Indians now actually camped near this post and who answer to regular roll-calls. It is made from actual count and is as correct as such a count can be:

All souls.

Kiowas	585
Comanches	479
Apaches	306
Total	1,370

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Men capable of bearing arms.

Kiowas	122
Comanches	83
Apaches	55
Total	260

This does not include the Pen-e-teth-ka Comanches belonging to the agency, who are now on the Washita River near the Witchita agency.

The line between the friendly and hostile bands is now well defined. and if the Government will persevere in its present attitude, the latter will soon be forced into such entire submission as shall secure peace to our borders for many years.

It has been remarked in my hearing that these operations against Indians could not continue long, as they entailed such heavy expenditures upon the Government.

I do not know how this may be in other departments, but in this department all the additional expenditures necessary for the actual war as it exists over and above those incident to the *quasi* war, which has existed since my connection with it, are at present more than covered by the saving of forage for animals in the field. In addition to this the Indian Department is saving over three thousand rations per day at this agency alone by the absence of the hostile bands.

There will unquestionably be some additional wear and tear of animals and material, but if there be any actual increase of expenditures it will be so inconsiderable as to count nothing as a motive for premature unsatisfactory settlement with these Indians.

Should they not surrender unconditionally before that time, I respectfully recommend that the troops occupy their country during the winter and until they do so surrender. Sheltered camps at suitable points can be found and supplied from the supply-depots for the several columns, where men and animals receive protection from extreme weather, and, at favorable moments, overrun the country, giving the Indians no rest nor sense of security. This will entail severe labor, and, possibly, some suffering, upon our troops, but I believe it will be effective.

During the past year I have visited every post in the department, some of them twice. I have found generally the condition of the troops to be entirely satisfactory in all that relates to their instruction and discipline. At most of the posts they are comfortably quartered. Fort Griffin is a sad exception to this rule. It may be made to answer the coming winter, but not longer, and if troops are to be kept there another year, new barracks must be built for them. There is nothing there on which repairs can be made. The buildings are mostly huts. One building alone at the post is possibly worth intrinsically a hundred dollars. This post is a very important one, in my opinion, and should be retained. I respectfully recommend that $80,000 be asked for to build suitable quarters there for six companies, four of cavalry and two of infantry.

The *morale* of the troops is good. There was a general desire on the part of officers and men to form a part of the several columns for the field.

Three officers, absent on leave, gave up their leaves to join commands in the field: Captain Lawson, Twenty-fifth Infantry, Captain Norvell, Tenth Cavalry, and Lieutenant Albee, Twenty-fourth Infantry.

In connection with this sentiment, I wish to state that I saw all these columns take the field, and in neither one of them did I see or hear of

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a drunken soldier, or one even under the influence of liquor. This is the more remarkable in the case of the columns from Fort Sill, as they were paid a short time before leaving the post; a very gratifying and hopeful exhibition of discipline and good *morale.*

I desire respectfully to invite attention to the operations of the act approved May 8, 1874, concerning the pay of officers when on leave of absence. The act is a very just one, except in the limits fixing the area within which alone it is operative. As it now stands, all but one of the most remote and inaccessible posts of this department are excluded from its benefits. Officers at some posts on railroads, in other departments, within two and three days' travel of New York, are entitled to the benefits of the act, while those at Forts Quitman, Stockton, and Davis, respectively seven, six, and five hundred miles from the nearest railroad in Texas, are excluded. The bill should be amended to include the whole Department of Texas, and I respectfully urge that Congress may be asked to make such amendment.

I inclose a tabular statement of expeditions and scouts made against Indians, horse-thieves, &c., within the department during the last year. I regard it as a highly creditable exhibit of work done by the troops. While most of this work is done by cavalry, the infantry have equally important and more vexatious labor at posts and with trains.

In addition to the scouts made, permanent camps have been kept up for the protection of settlements beyond the influence of the posts. From Fort Clark, two—one at the head of the Sabine, and one near Kerrville, Texas. From Fort Concho, three—one at Camp Colorado, one at the mouth of the Concho, and one near Johnson's Station, on South Concho. From Fort Sill, three, on the direct road between the post and Fort Griffin—one at the crossing of Red River, one on the Beaver, and another at the Brazos. These latter camps have, I think, been very useful in preventing raids into Eastern Texas. From Ringgold Barracks, three—one at Roma, one near Edinburgh, and one at Santa Gertrude's Ranche. From Fort Brown, one, and sometimes two on the Rio Grande, above. From Fort Duncan, one on the Rio Grande, below.

The companies at the camps are frequently changed with others from their supplying posts. Since the commencement of present hostilities these camps, except those from Ringgold Barracks and Fort Brown, have been abandoned, and the troops occupying them sent into the field.

I inclose also a list of killed, wounded, and captured by Indians, and a report of the movements of troops in the department during the same period.

With the exception of the chief engineer of the department, of whose case a special report will be made, all chiefs of the general staff department at headquarters of the department, and the officers of my personal staff, have merited and received my entire approval and commendation for the faithful and efficient performance of the many varied and important duties confided to them.

Very respectfully, your obedient servant,

C. C. AUGUR,
Brigadier-General Commanding.

Col. R. C. DRUM,
Ass't Adj't General Military Division of the Missouri, Chicago, Ill.

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REPORT OF MAJ. GEN. IRVIN McDOWELL.

HEADQUARTERS DIVISION OF THE SOUTH,
Louisville, Ky., September 30, 1874.

SIR: I have the honor to submit to the General of the Army the following report of the military operations and military service in this division since the 6th of October, 1873, the date of my last annual report:

DEPARTMENT OF THE SOUTH.

October 25, 1873.—Companies B and C, First United States Artillery, left Fort Pulaski, Ga., for Saint Augustine, Fla. Arrived at that post on the 26th of the same month. Relieved companies F and H, Second United States Infantry, which were at once placed *en route* for Atlanta, Ga., at which post they arrived on the 29th of October.

January 16, 1874.—Second Lieut. G. E. Bacon, and twenty-five men of Company K, Sixteenth Infantry, went from Frankfort to Monterey, Ky., to assist United States marshal in serving civil processes in that vicinity. The detachment returned to Frankfort February 24.

April 20, 1874.—In obedience to instructions from the War Department, First Lieut. C. H. Noble and forty men of Company D, Sixteenth Infantry, went from Humboldt, Tenn., to Little Rock, Ark., to aid in preserving the peace. The detachment returned to Humboldt May 26. A detailed statement of the troubles at Little Rock was made by Capt. Thomas E. Rose, Sixteenth Infantry, and forwarded to the Adjutant-General United States Army June 27, 1874.

June 14, 1874.—Capt. A. W. Kroutinger and fifteen men of the Second Infantry were sent from Mount Vernon Barracks, Ala., to Jackson Barracks, La. Captain Kroutinger was relieved from its command July 27 by Second Lieut. S. E. Clark, Second Infantry, and returned to his proper station. (The detachment has been ordered to return to Mount Vernon.)

June 23, 1874.—Company D, Sixteenth Infantry, (Capt. H. A. Theaker,) was sent from Humboldt, Tenn., to Jackson, Miss., in the Department of the Gulf. It is still in that department. Second Lieut. S. R. Whitall, Sixteenth Infantry, and a small guard, remained at Humboldt to guard public property.

July 7, 1874.—Company F, Sixteenth Infantry, (Capt. W. G. Wedemeyer,) was sent from Nashville, Tenn., to Manchester, Coffee County, Tenn., to assist a United States marshal in serving civil processes. The company returned to Nashville August 27.

August 25, 1874.—Company G, Sixteenth Infantry, (Capt. D. M. Vance,) was sent from Nashville to Humboldt, Tenn. It is still at Humboldt.

August 25, 1874.—Second Lieut. W. C. McFarland, Sixteenth Infantry, and thirty-five men from Company K, were sent from Frankfort to Monterey, Owen County, Ky., on the requisition of the United States marshal, to protect his deputies in the performance of their duties. The detachment is still at Monterey.

September 8, 1874.—I received the letter of the General of the Army of the 5th September, transmitting a copy of a letter from the Secretary of War of the same date, inclosing letter and circular of the 3d of

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September from the Attorney-General of the United States, concerning alleged outrages of various descriptions in certain States in this division.

September 9, 1874.—In obedience to the instructions above mentioned, I detached Company A, Second Infantry, from Atlanta to Livingston, Sumter County, Ala., and on the 11th September, from the same place, Company H, Second Infantry, to Eufaula; Company F, Second Infantry, to Montevallo, Shelby County; Company B, Second Infantry, to Carrollton, Pickens County; and Company I, Second Infantry, to Butler, Choctaw County, Ala. On the same day I sent Company D, Eighteenth Infantry, from Columbia to Edgefield, S. C.

September 12, 1874.—Company D, Second Artillery, was sent from Charleston to Barnwell, S. C.; Company H, Eighteenth Infantry, from Columbia to Abbeville, S. C.; and Company D, Second Infantry, from Atlanta, Ga., to Opelika, Ala.

September 14, 1874.—Company G, Second Artillery, was sent from Raleigh, N. C., to Spartanburgh, S. C., and Company E, Second Artillery, from Fort Macon, N. C., to Marion, S. C.

September 21, 1874.—Company M, Second Artillery, was sent from Fort Johnston, N. C., to Unionville, Union County, S. C., and September 23 a company of the First Artillery was ordered from Saint Augustine, Fla., to Charleston, S. C.

September 14, 1874.—Company F, Second Artillery, was detached from Raleigh to Marion, N. C. This was done at the request of the Secretary of the Treasury, on the application of the Commissioner of Internal Revenue, and the supervisor of the United States internal revenue for the district of Virginia, North Carolina, South Carolina, Georgia, and Florida, to aid the United States and civil officers in suppressing the illicit distilleries in Western North Carolina, it being represented that it was impossible, from the number and lawlessness of those engaged therein, to do so without military aid. The supervisor says as follows, in his letter applying for troops:

In discharge of my duties as supervisor of internal revenue, I have found more difficulty in enforcing the laws in Western North Carolina than in any part of the State. At least four times I have made requisition for troops to go into this same part of the country. The violations of law in that section are very general and important. I have information of a hundred distilleries now in operation there contrary to law. The inhabitants are ignorant and remarkably lawless. There are large areas, in some cases amounting to a third or half of a county, in which an officer hardly dares to attempt the execution of the laws.

Open threats against life and person are very common, and made by a reckless class of men, who, under circumstances favorable to their security, would not hesitate to execute their threats. Several officers have been killed already. Not only is the practical enforcement of the revenue laws almost entirely prevented, but successful resistance to deputy marshals, and avoidance to the processes of the United States courts are very common.

The Commissioner and supervisor urge me strongly that the company be stationed at Marion, but considerations of a military nature cause me to have it only encamp there as a detachment from Raleigh. It may become necessary to comply with the desire of the Commissioner, but I hope not.

September 16.—On account of the critical state of affairs in New Orleans, I sent there Company A, Eighteenth Infantry, from Atlanta; Companies G and I from Columbia, S. C.; and Company F, Sixteenth Infantry, from Nashville, Tenn.; and September 17, Company F, Second Infantry, from Montevallo; Company D, Second Infantry, from Opelika; and Company G, Second Infantry, from Mount Vernon Barracks.

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Subsequently, on the 18th of September, when the commander of the Department of the Gulf reported that he had sufficient troops, and a regiment was joining him, I ordered Companies D and F, Second Infantry, back to Alabama, (where serious disturbances were reported,) one of them to re-occupy Montevallo, and the other to go to Demopolis.

RIOT AT GEORGETOWN, S. C.

The commanding officer at Charleston, S. C., telegraphed me August 16 that a special messenger had just come in to him from the intendant of Georgetown, S. C., representing the town to be in the possession of a mob, and threatened with fire and pillage; that a house had been attacked, and three of the inmates shot. That on the 14th of August the United States mail-stage had been attacked as it was entering the town. That the sheriff of the county had exhausted the means at his disposal to repress the riot, but had been threatened, and had confined himself to his home; and that the respectable citizens were greatly alarmed, and helpless to protect themselves. The difficulty was represented to have grown out of a quarrel between the political factions among the negroes. The parties interested applied for a company of United States troops to protect the lives and property of the well-disposed white and colored citizens. The application was not granted, and the commanding officer was telegraphed that the case seemed one for the action, primarily at least, of the State authorities.

THE RIOT AT LANCASTER, KY.

The post commander at Lancaster, Ky., reports that soon after the election at Lancaster a controversy arose between two citizens of that place, both being prominent members of different political parties; that the difficulty attracted the friends of each, and increased in intensity until the night of August 19, when a conflict took place between them in the public square, in which several hundred shots were fired, and four persons wounded; that on the 20th he was called upon by the sheriff of the county to aid him with his command to preserve the peace, which he did; that on the 21st the town marshal called upon him for the same purpose, to which call he responded; that no disturbances occurred in the day-time of the 20th, but that on the night of the 21st a large number of citizens from the county, and those adjoining, friends of one of the parties, assembled in the town, and during the 22d attacked the house in which the friends of the other party had assembled, and were defending themselves, and about 6½ p. m. fired the house by the throwing of turpentine-balls, and that great apprehension existed among the people that the town would be fired; that while the building was in flames he received a communication from the collector of the internal revenue, asking protection for his office and the United States property in his charge; that he replied he would give him all in his power; that at the same time the town marshal, in person, served on him a written requisition for aid to quell the riot; that in endeavoring to do so the troops were fired upon, and one man was slightly wounded; that the troops returned the fire, dispersed the mob, took charge of the party who had been in the house, and took them to camp, where, by direction of the town marshal, they were released; that thereafter there was no disturbance.

Subsequently a portion of the militia of the State, under orders from the governor of Kentucky, came and occupied the town.

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The aid to the local civil authorities, on their direct application, was given under a circular from these headquarters, of April 3, 1871. (A copy herewith, marked A.) Doubting, however, the soundness of the principle laid down in the second paragraph of this circular, though I am aware of its having been sanctioned by high authority, legal as well as military, and being apprehensive of a conflict with the officers of the State of Kentucky, in a matter purely local, and in no way affecting the United States laws, I telegraphed the commander "not to interfere in any matter merely concerning the State authorities."

Owing to an accident to the telegraph line the message was not received, (fortunately, perhaps, for the people of Lancaster,) till the whole affair was over.

OUTRAGES IN VICINITY OF HUMBOLDT AND TRENTON, TENN.

I send herewith, marked B, a letter of August 23, from the commanding officer of the small detachment left at Swayne Barracks, Humboldt, Tenn., when the company of the Sixteenth Infantry was sent from that place to Jackson, Miss., last June. The letter is accompanied by affidavits, taken by the commanding officer, of certain colored people, alleging maltreatment at the hands of the whites.

On the 24th of August a telegram was received from the commanding officer, saying:

> Send me fifteen or twenty men at once. The whole country around are under arms on account of the killing of some Ku-Klux by negroes Saturday night last. The Ku-Klux have been riding in large numbers for two weeks.
>
> Parties have fired into camp at night. Threats made to attack us. All approaches to the garrison watched by armed pickets every night. Colored people are driven from home and work, some shot. All in the garrison are worn out by constant night-watching and fatigue. Send full reports and affidavits by mail.

Orders were telegraphed to Nashville to send a company of the Sixteenth Infantry to Humboldt, and a company arrived there August 25.

In his report of the 16th instant of the occurrences connected with the service at the post during the past year, the commanding officer for the time being says:

> Although the number of detachments called out to assist the United States marshal are about the same as last year, complaints of outrages of various kinds committed on the negroes have been more numerous, particularly since the middle of August, and, from such information as they bring in, the Ku-Klux have been riding almost every night in portions of this (Gibson) and adjoining counties.
>
> The recent disturbances in this section of the State all seem to have started about the time the civil-rights bill was brought before Congress, and the reports of outrages committed on the negroes by these outlaws have been more numerous since about that time than at any other period in the last three years. Many of these have simply amounted to the mere act of frightening colored men away, for the purpose of securing the small crops they have made, which is easily accomplished by threatening them with a visit at night of Ku-Klux.
>
> I have learned since the Trenton massacre, that just previous to that time, say about the 23d of August, every bridge, railroad and river, and all roads and important points, were strictly guarded by the whites up to the time of the massacre, and for some days after the whole country was scoured by armed men for the purpose of capturing those who were supposed to have made their escape.
>
> Of the men who were taken from the jail at Trenton, on the morning of the 26th of August, three have reached the garrison in safety, and are now in Memphis under protection of the United States marshal, and three more are known to be alive and at large.
>
> Since the recent troubles here, the number of outrages reported to me by parties who have been bea en, &c., had been comparatively few, from the fact that the Ku-Klux organization now seems to be so perfect, that the parties outraged are, in most instances, prevented from coming here to give information themselves, and the fact of

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the outrages having been committed is only learned by general report through the country, and from some of the friends of the parties, who pass the news from one to another.

Many outrages would be prevented, and many more of the Ku-Klux would be arrested and brought to justice, if a United States commissioner and one or two deputy United States marshals were stationed at every point where there is a regular garrison, instead of their being so remote, as is the case here.

A very bitter feeling seems to exist among the people throughout this entire section of the country, against the Government, and particularly against the negro, and the few Union men who reside in this vicinity are completely cowed, and live in constant fear. Several of them have had threats made against their lives, to my own knowledge, during and since the recent disturbances.

I ask attention to the suggestion that a United States commissioner and a deputy marshal be appointed at places occupied by troops, so that the action of the latter may be prompt enough to be of effect; for, by the orders I have given, the troops are to be held in readiness to act on any requisition made on them by a United States civil officer, but that officers of the Army, as such, should take no initial action, but only act in aid of, and in subordination to, the United States civil authority.

TROUBLES AT EDGEFIELD, S. C.

The commanding officer of Company D, Eighteenth Infantry, established in camp at Edgefield, reports that on the 23d of September, a delegation of the leading white and colored citizens of Edgefield waited on him and reported a fight there imminent, or in progress, between the white and colored people at Glover's plantation, in Edgefield County, South Carolina, about fifteen miles from Edgefield, and ten from Augusta, Ga.

The commanding officer says:

I immediately started with ten men and a non-commissioned officer in a wagon kindly placed at my service by the citizens of this place. *En route* I met armed bands of white men, who reported that the difficulty had been settled. I continued on, however, and on approaching the place found matters far from settled. Bands of armed white and colored men were assembling from every direction. The former numbered at least three hundred men, and of the latter I saw only about seventy-five or eighty, but am satisfied a much larger number was concealed in the woods, judging from the bold front they presented. I at once proceeded to find the leader of the colored people, one Ned Tannant, but was unable to see him that night, some of his men stating to me that he was not present.

I then proceeded to Mr. Glover's house, where a part of the white forces were bivouacked. In conjunction with some of the best citizens of this party I talked the matter over, and, I am happy to say, their wise counsels prevailed with their men.

This morning about day-break the white forces united, and the subject was again talked over. I then proposed to have one or two of the whites accompany me and have a talk with the blacks, so as to prevent bloodshed and arrive at a proper understanding. This was accepted at once. Accompanied by three of the whites, I met this man Tannant, and, after a protracted private interview, in which he stated his version of the difficulty, it was finally agreed to disband both parties, which was done, but, I must say, rather reluctantly on the part of the whites.

Having accomplished my mission to the satisfaction of the good men of both parties, I returned to this place, arriving this p. m.

During my absence the command of the camp devolved on First Sergeant Campbell, a very intelligent and discreet soldier.

Owing to the excitement prevailing last night in consequence of the influx of armed bands, both white and black, coming from the upper part of the country, the intendant or mayor deemed it prudent to prevent the entry of those parties to the town, and called on the military to assist the citizens to preserve the peace. Sergeant Campbell promptly responded, and furnished the desired number of men.

The mayor called on me again this evening to assist as before, and I have twenty men on duty. With every indication of perfect quiet this 11.30 p. m., to-morrow, I think, will find all the parties at their homes, as I am satisfied they have departed from this vicinity to-night.

Both parties are well armed, arms having been received by the whites since my arrival, without any endeavor at concealment on their part. In fact, the whole country is perfectly organized and ready to take the field at any time. The blacks (militia) are armed by the State.

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After a careful investigation of the difficulty at the Glover plantation, I am satisfied the facts are as follows: Ned Tannant, a captain of militia and a delegate to the late republican convention at Columbia, S. C., a very prominent negro and living on the Glover plantation, had an attack made on his cabin on Saturday night, the 19th instant, by a party of five white men, who discharged three pistol-shots into his door and then rode off. He suspected Glover and one Adams to have been of the party, and at once beat his drum as a signal for the negroes to assemble at his place, this being the signal previously agreed upon to meet emergencies of this sort, as Tannant states, to save his life. Having assembled his men and sent runners out threatening vengeance against Glover and his family, he (Glover) was not slow to learn the condition of affairs, and in turn signaled his people. In a few hours the whole country was in the wildest state of excitement. During all this time nobody seemed to know the whereabouts of the county sheriff. The general impression is that he has fled the country.

I will endeavor, as heretofore, to reconcile the parties and preserve the peace to the best of my ability. In the absence of any special or general instructions, I trust that the course I have pursued in this matter will meet the approbation of the major-general commanding.

The company was stationed at Edgefield on the application of the Attorney-General, as a suitable place to carry out the purpose of his circular of the 3d of September to the United States marshals and attorneys, which purpose was to give them all needful aid in the discharge of their official duties.

It will be noticed that there was no civil officer present, either of the United States or of the State. Under these circumstances the personal conduct of the commanding officer has been approved by me. His position was an embarrassing one, and one an Army officer should not occupy, not only on account of the responsibility he has to incur, but still more on account of the administration of the civil or common law.

TROUBLES AT AND IN THE VICINITY OF LIVINGSTON AND BELMONT, SUMTER COUNTY, ALABAMA.

The commanding officer at Livingston, Ala., which place has been recently occupied on the application of the United States Attorney-General, reports on the 22d September, that on Sunday, the 20th instant, he held a detachment ready to proceed to Belmont, but that on that day all parties dispersed. He says:

For the information of the commanding general, I would respectfully state the cause of all the gatherings of whites and negroes, in arms, in this and the adjoining counties. The white people have an organization throughout this county known as the "White League." They are determined that the negroes shall not vote at the coming elections unless they vote as they do. To effect this they do everything to intimidate the black people. The two most active republicans in this county, Billings (white) and Ivey, (colored,) have been assassinated in the county since the 1st of August. These murders have had a very great effect on the colored people, particularly as they see no arrests have been made, nor have any steps been taken to find out the offenders. To keep up the fear among the blacks, the whites now get together almost every day and night and ride the rounds in squads of from thirty to fifty men, armed with shot-guns, pretending that the negroes are arming and gathering to attack the white people, which is not the case. There have been no parties of the negroes of any strength together. This place is the headquarters from which these parties start, and I would respectfully ask that I be permitted to keep my men well in hand at this place, where I can always know what is going on and be ready to move men to the neighborhood of any threatened disturbance.

Since I arrived here, on the 11th instant, there have been gatherings at three different points in this county; no collision has occurred nor will there be as long as the white people can intimidate the blacks by display of armed force. A night attack on my camp is freely talked of here and in the country around, but I do not fear anything of the kind. On Sunday night, about midnight, about thirty men, well armed, rode into the town, remained about fifteen minutes near the camp, and then rode off. I keep a good guard against anything of this kind.

The report above made by Captain Mills, that the "White League" organization exists in Alabama, is confirmed by the statement made to me personally by a prominent and well-informed resident of New

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Orleans, that this organization not only extends into the country parishes of Louisiana, but into the State of Alabama as well.

In addition to the cases hereinbefore specially mentioned, there have been forty-two detachments sent out from the posts of Lancaster and Lebanon, Ky., Humboldt and Chattanooga, Tenn., Huntsville and Mount Vernon Barracks, Ala., Atlanta, Ga., Yorkville and Newberry, S. C. They were in aid of the United States marshals and officers of the United States internal revenue to enforce the writs of the United States courts.

DEPARTMENT OF THE GULF.

I send herewith the report of the colonel commanding the Department of the Gulf.

Last April there was a riot and disorder at Little Rock, a disorder of so much magnitude as to require the company then stationed there to be re-enforced from Humboldt, Tenn.

The disturbances grew out of the claims of two political parties as to which of their candidates was the rightful governor of Arkansas.

The report of the commanding officer of Little Rock Barracks (Captain Rose, Sixteenth Infantry) has already been submitted to the War Department. The captain's course was judicious and effective, and deserving of commendation.

June 9, the Nineteenth Infantry, then stationed in Louisiana, was ordered to be relieved and sent to the plains, and in order to secure the funds then remaining of the appropriation for "transportation of the Army," which, if unused, would be covered into the Treasury, the movement was ordered to take place without delay.

The Third Infantry, which was to replace the Nineteenth, arrived at Holly Springs the 5th of July, and being just from the plains was ordered to encamp there for the hot weather, and not go farther south till the sickly season should have passed. Thus it was that there was during the summer in Louisiana but a detachment of fifteen men to guard the public property at Jackson Barracks, New Orleans, one company to guard the barracks at Baton Rouge, and a company at Colfax, Grant Parish.

September 8.—In accordance with the General of the Army's order of the 5th, I ordered the commander of the Department of the Gulf, then here at division headquarters, to send the Third Infantry to Louisiana, distributing it between New Orleans, Baton Rouge, Alexandria, Shreveport, Saint Martinsville, Harrisonburgh, and Monroe.

For this purpose he went to his headquarters at Holly Springs and was occupied in making provision for the transportation, medical supplies, and pay of the regiment, when he received the pressing telegram from New Orleans referred to in his report, and took the measures therein stated, subsequently going in person to New Orleans and taking with him such troops as were at hand, or were under orders for other posts.

On the receipt of the President's proclamation of the 16th of September, I strengthened Colonel Emory by sending him with all dispatch all the companies within reach that could possibly be spared, suspending for the time the execution of the orders of the 5th, relating to the Department of the South, and even taking companies from places but recently occupied.

Since then, several companies of the Twenty-second Infantry have arrived at New Orleans from the lakes, and other troops are on the way there from the plains; and the companies taken from Alabama have been sent back to fulfill the duties which the emergency in New Orleans had suspended; and the places in Louisiana have been, or soon will be, occupied as heretofore ordered.

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As the condition of the military service will be affected by the question as to the need at all of any troops at the South, and if needed, as to when the need will cease, I beg to transcribe the following extracts from the statement made by me last January, before the Military Committee of the House, at the time it was proposed to reduce the military establishment, and when it was the wish and belief of most that the need of any portion of the Army at the South, away from the sea-coast defenses, had passed, or was soon to pass by.

The CHAIRMAN. State what the troops are doing in Kentucky.

General MCDOWELL. The last part of my answer (that troops were aiding the United States civil authorities in the enforcement of the United States laws) will apply to the troops in Kentucky. At this moment there is a portion of those troops, acting under the United States marshal, serving writs, which he declares he cannot serve without the aid of military force. There are but three companies in the State of Kentucky—a mere police force; one company is stationed at Lancaster, one at Lebanon, and one at Frankfort. They are stationed at those places chiefly because the troops are better provided for there than they would be elsewhere. In the case of Lancaster, the troops were sent, and are kept there at the earnest entreaty of its citizens, on account of the disturbed state of the country. I went to Lancaster to see if that post could not be broken up and a post established at Nicholasville; but, as the two places were close together, I decided to make no change, on account of the expense involved in so doing, and because there seemed to be an equal balance in the demands of the two places.

* * * * * * *

The CHAIRMAN. Is there a feeling of apprehension of disturbances by the Ku-Klux in that region—South Carolina?

General MCDOWELL. I don't think there is any general feeling now; but I think, if you will ask the two parties down South, they will concur in one thing, and that more perhaps because of its moral effect than of any physical force that could be exercised, that the presence of a small force there is of a great benefit to the peace and quiet and prosperity of the country. I think that both parties will agree in that. The ignorant poor whites, as they are called, have a feeling of hostility against the blacks, and the other whites have a feeling of distrust of and disgust at the political action of the masses of the blacks, particularly in South Carolina and Louisiana. In South Carolina the colored element is predominant; it has complete control of the State and of its principal city, Charleston, the limits of that city having been extended, I am told, many miles into the country, so as to give the colored population complete control of the city as well as the State. The State taxation is excessive, and there is a strong feeling on the part of persons who own property against the State government, and the condition of affairs produces considerable uneasiness throughout the community, both on the part of the blacks with respect to the whites in the upper districts, and upon the part of the whites of the blacks in the lower country.

The CHAIRMAN. Will you state the condition of Louisiana and the troops you have there?

General MCDOWELL. Louisiana is in a very disturbed condition. It was so last year, and is so still, and I fear is likely to remain so for some time to come, on account of the reasons which I have before mentioned. The military posts in Louisiana are very much changed during the year; troops being shifted from one place to another as the necessity for their service may appear to the department commander to require. The permanent posts are the Jackson Barracks, New Orleans, and the barracks at Baton Rouge, both Government barracks, both on Government land, and both permanent in their nature and character. From these two posts the department commander has established various small temporary posts, breaking them up from time to time and bringing the troops back again, or shifting them as the occasion may have required. I think it is safe to say that the troops in Louisiana have been of immense public good. It is so recognized, I believe, by all parties. They have been preservers of the peace; and I think that their whole course has been of the most conservative character. As I said in my annual report, the duty devolved upon officers and men and their commander in the Department of the Gulf during the past year has been of the most delicate, important, and, frequently, embarrassing kind, and has been discharged with tact, fidelity, and in all cases with effect.

The CHAIRMAN. Can you state the reasons for keeping the military force there?

General MCDOWELL. The reasons grow entirely out of the sequelæ of the war, the reconstruction acts, the condition of the colored race, and the relations which it bears to the other inhabitants of that State, and the fact that the city of New Orleans, with its large commerce, its capital, its connections with the centers of capital and commerce in other parts of the world, has a white population principally, and that the State itself is largely in the hands of colored people, and that these two elements thus far have not been harmonious. There has been distrust on the one side against the

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other and misunderstandings, perhaps largely the result of causes which look away back to the past, and which will take some considerable time in the future before they are all disposed of. It is a philosophical as well as a political question, about which people may differ; but the fact stands that the problem presents very great complications, and of which I do not myself see the solution, and I doubt if any one knows, although he may think he does. I was there last winter and am going there now; and I can say that the military force there has been of immense consequence, not for the physical effect which a small handful of men could produce, but for its moral effect. I think this same remark may apply in a large degree to the troops all through the South. The number of troops all through this vast region of country is little over three thousand men, so insignificant that it cannot exercise any material physical effect.

I have wished as a matter of economy, military discipline, and efficiency, to have the troops as much concentrated as possible, and when and where possible to have them in Government buildings on Government ground. The quarters occupied at many places in the South are temporary shanties, built mostly during the war, and now in a state of decay. I ask attention again to my recommendation that Augusta arsenal, which is utterly out of place and of position to be continued as an arsenal, be turned over for use as a garrison for troops, and that the estimates heretofore submitted for converting the buildings at Mount Vernon Barracks into quarters be favorably acted on as soon as Congress shall act on the recommendation to revoke the authority for its sale.

I send herewith the reports of the chiefs of the several staff departments at department headquarters of the operations under their charge during the past year.

I have the honor to be, very respectfully, your obedient servant,

IRVIN McDOWELL,
Major-General, Commanding Division of the South.

The ASSISTANT ADJUTANT-GENERAL,
Headquarters of the Army, Saint Louis, Mo.

REPORT OF BVT. MAJ. GEN. W. H. EMORY.

HEADQUARTERS DEPARTMENT OF THE GULF,
Holly Springs, Miss., September 15, 1874.

SIR: I have the honor to submit the following report of the condition of affairs in this department, and the operations in it since the date of my last annual report. The following troops constitute the force now serving in the department:

Companies A, E, F, I, L, and M, and two majors, First Artillery. The Third Infantry, and Companies B, C, I, and H, and one major, Sixteenth Infantry.

In addition to the foregoing, Company D, Sixteenth, and a detachment of an officer and fifteen men of the Second Infantry are temporarily serving in the department.

These troops are distributed as follows:

Companies A, F, L, and M, and one major, First Artillery, at Fort Barrancas, Fla.

Companies E and I and one major, First Artillery, at Key West, Fla.

The Third Infantry is encamped for the summer at Holly Springs, Miss.

A major and Company D, Sixteenth Infantry, at Jackson, Miss.

Companies C and I, Sixteenth Infantry, at Little Rock, Ark.

Company B, Sixteenth Infantry, at Colfax, La.

Company H, Sixteenth Infantry, at Baton Rouge, La.

Detachment of Second Infantry at Jackson Barracks, La.

Since my last report the Nineteenth Infantry has been moved from

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this department, where it had served for so long a time and so creditably, and has been replaced by the Third Infantry.

It was not considered necessary to distribute this regiment, composed of unacclimated men, to the posts it is intended to garrison, before the fall frosts had removed all danger from contagious diseases, and it was placed in camp at Holly Springs, Miss., a very healthy point, where the men were made comfortable, and the opportunity offered by the concentration of the regiment utilized in perfecting its instruction and discipline.

On the 9th of September, in pursuance of orders received, the regiment was distributed: the headquarters and four companies to Jackson Barracks; the lieutenant-colonel to Baton Rogue; the major and two companies to Pineville, near Alexandria, La., and one company to each of the following posts: Monroe, Harrisonburgh, Shreveport, and Saint Martinsville, La. Most of the companies are at the posts designated; the others are on their way to them.

Two companies of the First Artillery from Barrancas were also ordered to take post at Baton Rogue, La., and the post of Colfax was discontinued. The garrison of Jackson, Miss., and Baton Rogue, La., are parties temporarily holding these points.

The troops from Colfax are to proceed to Jackson, Miss., and there take post, and the company from Baton Rogue, on being relieved by the arrival of the First Artillery, is to repair to the same point, when Company D, Sixteenth Infantry, is ordered to return to its station at Humboldt, Tenn.

As a measure of precaution against the yellow fever, the garrison at Key West, Fla., was moved about the 1st July to Key Biscayne Bay, Fla., where it is temporarily encamped; and for a similar reason the headquarters of the department have been temporarily established at Holly Springs, Miss.

So far this year the department has been spared epidemic diseases, and the health of the troops is all that could be desired. The posts have been thoroughly inspected during the year, the result showing that the troops are in a fair state of discipline and that the officers and men generally discharge their duties with zeal and intelligence, and that the necessary supplies of all kinds have been amply furnished.

The bi-monthly inspections of the accounts of disbursing officers, made in compliance with law, have shown that these officers have discharged their duties with accuracy, judgment, and economy, and that the laws regarding disbursements and the safe-keeping of public funds have been complied with.

The small amount of funds for the Quartermaster's Department, which the condition of the appropriations for the current fiscal year has allowed to be assigned to the use of this department, has caused a degree of retrenchment which is beyond true economy and cannot but result in injury to the service. I was obliged, at one time, to order that no extra-duty men be allowed in the Quartermaster's Department, as there was no money to pay the *per diem* to which men so detailed are entitled, but a small addition to the sum previously allowed has enabled me to recommend to the division commander the employment of a small number of men on this kind of duty. For a similar reason, the division commander has taken the whole subject of repairs to barracks and quarters out of my hands, the amount of funds for this purpose available for the whole division being so small that it was not considered advisable to divide it. I consider this act very inconvenient to the service and injurious to my authority, and I request it may be changed as soon as circumstances will permit.

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The duties of the chief commissary of subsistence of the department are two-fold, those which pertain to the department and those which, by existing orders, lie entirely outside of and independent of the department commander, and this last class is now so much more extended than the former as apparently to subordinate the department position to the injury of good order and discipline and the inconvenience of the troops serving in the department. I therefore respectfully suggest that the depot and purchasing commissary in New Orleans be wholly relieved from duty with the troops serving in the Department of the Gulf, and that the duties of chief commissary of the department be performed by some officer of the line of the Army, of whom there are many both competent and available to be selected by the Secretary of War.

During the past year the troops in the department have been required but once to interfere actively in civil affairs, and this was on the occasion of the insurrection against the authority of the State officers in the State of Arkansas. By order of the President of the United States two companies of the Sixteenth Infantry, under the command of Capt. Thomas E. Rose, of that regiment, then stationed in Little Rock, were interposed, first, to stop bloodshed between the contending parties, and, finally, to sustain the governor in his seat. The report of Captain Rose, given much in detail, has already been forwarded with what I considered a just commendation of the coolness and efficiency with which Captain Rose and the officers and soldiers of his command had discharged a delicate and onerous duty.

Several small bodies of troops have been furnished the United States marshal to act as *posse comitatus* to aid in the execution of decrees of the United States courts in cases where evidence has been furnished that the civil arm was otherwise impotent to enforce such decree.

In this connection I beg to call attention to the delicate and undefined nature of the duties imposed on troops serving in this department, and upon those similarly situated, and to suggest that some general rule of action to be defined, and the persons performing such duties protected by law in the execution of them. At present the troops are expected to keep the peace without having any power to correct abuses, however flagrant, or any power to arrest parties for the most criminal offenses, and yet their presence on any occasion of riot and disorder renders them liable to civil suits if casualty should occur even by accident.

Yet it cannot be denied their presence is necessary to the continuance of peace in the southern country, and, in my opinion, to the existence of the Government itself, and I therefore do not consider it too much to ask that the whole subject of their duties in the southern country may form the subject of consideration. Inclosed is the record of events for the past official year.

I am, sir, very respectfully, your obedient servant,

W. H. EMORY,
Colonel and Brevet Major-General Commanding.

The ASSISTANT ADJUTANT-GENERAL,
Division of the South, Louisville, Ky.

[Postscript.]

HEADQUARTERS DEPARTMENT OF THE GULF,
Holly Springs, Miss., September 15, 1874.

After all the arrangements had been made, and the transportation engaged for the Third Infantry to distribute it as above indicated, on Sunday, the 13th instant, about 3 o'clock p. m., after all the down-trains

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had passed, the alarming telegram (marked No. 1) was received from Mr. S. B. Packard, United States marshal for the district of Louisiana.

From ordinary sources this telegram would not have received much attention, but, having always found the marshal's statements reliable, and as the troops were already under orders for New Orleans, under the requisition of the United States Attorney-General I concluded to hasten the movement by all practicable means, even to the employment of a special train, and I also directed the small detachments at Jackson, Miss., and at Jackson Barracks at New Orleans, at once to repair to the custom-house in the latter place, and there consult with the United States marshal for the protection of the public property reported by him to be in imminent peril.

Feeling the gravity of the situation and the *onus* placed on the military arm by the demand of the civil authorities for protection, and pending the movement of the troops toward the scene of threatened violence, I addressed the telegram (marked No. 2) to Marshal Packard.

The telegram from him (marked No. 3) reiterates the demand for military aid, which, under both general and special orders, I am required to give, and I considered it to be my duty to furnish that aid at whatever cost.

I consider the whole transaction well worthy of the higher authorities as showing the helpless and dependent condition of some of the State governments in this department, and it may be perhaps my duty to state what I believe to be the case, that I see no prospect of these governments improving or becoming more stable so long as they are based upon universal suffrage or until the suffragists become better educated.

W. H. EMORY,
Colonel and Brevet Major-General Commanding.

REPORT OF MAJ. GEN. J. M. SCHOFIELD.

HEADQUARTERS MILITARY DIVISION OF THE PACIFIC,
San Francisco, Cal., September 14, 1874.

SIR: Since the date of my last annual report, November 3, 1873, satisfactory progress has been made toward a final settlement of Indian questions in this division, so far as depends upon military operations. In the Department of Arizona, under the wise and vigorous administration of Brigadier-General Crook, the few Apache chiefs who had obstinately refused to submit to necessary restraint have been hunted down and killed. The disturbing elements of the Verde, San Carlos, and Apache reservations have thus been removed, and General Crook now believes that "if the Indians on these reservations are properly managed, kept at work, furnished with seeds and implements, and their present interest in raising stock and making themselves homes, encouraged, there will be no further trouble with them, and they will gradually become self-supporting."

It is greatly to be desired that these Indians should not be disturbed in their present reservations, and that a work so well begun may be continued to its legitimate end.

The condition of the Hualpais, recently removed from their old homes in the mountains to a reservation on the Colorado, is most deplo-

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rable. A serious error was evidently committed in selecting this reservation, an error which should be corrected without delay.

The Indians upon the Chiricahua reservation not being under military control, cannot be restrained from making depredations upon the neighboring people of Sonora. Frequent complaints are made of such depredations, although the people of Arizona have been exempt from them during the past year.

I respectfully refer to General Crook's report for details upon these subjects, and recommend his views thereon to the serious consideration of the Interior Department.

In the Department of the Columbia a threatened collision between the Nez Percé Indians and the white settlers was averted in June and July last, by the prompt movement of troops into the Indian country. The department commander, Col. Jeff. C. Davis, Twenty-third Infantry, who accompanied a portion of the troops, and made a general inspection of that portion of his department, does not now fear any immediate trouble with these Indians, but recommends that they receive the early attention of the Indian Department. I respectfully refer to Colonel Davis's report for full information upon the subject referred to, and other matters in the Department of the Columbia.

The Department of California has remained undisturbed by any threat of hostilities, and hence the very small force stationed in this department has not been called upon for any operations in the field beyond the customary scouting and explorations designed to keep the troops in efficient condition, and give them a thorough knowledge of the surrounding country.

The following changes of stations of troops have been made, or are now in progress: The Eighth Infantry, from the Department of the Platte, has relieved the Twenty-third Infantry, in the Department of Arizona, which latter regiment is now *en route* to its new station in the Department of the Platte. Companies F and L, Fourth Artillery, from the harbor of San Francisco, have relieved Companies C and D, at Sitka, Alaska, which latter companies have taken post at the presidio of San Francisco.

Camp Warren, Oreg., being a very expensive post to supply, and being no longer needed, has been ordered to be broken up; its garrison, Company D, Twenty-first Infantry, has taken post at Camp Bidwell, Cal.

The business of the several staff departments has been conducted in a satisfactory manner with due regard to economy and the general interests of the public service.

In the pay department this has been accomplished only by extraordinary efforts on the part of the too small number of officers of that department. Unless the number of efficient paymasters be increased at no distant day, there must of necessity be some failures in the regular payment of the troops.

I take pleasure in renewing my high commendation of General Crook's management of the difficult Apache problem, in Arizona, also my cordial approval of the administration of the Department of the Columbia by Col. Jeff. C. Davis, who has now relinquished that command to his senior officer, Brig. Gen. O. O. Howard.

I am, sir, very respectfully, your obedient servant,

J. M. SCHOFIELD,
Major-General.

The ASSISTANT ADJUTANT-GENERAL,
Headquarters of the Army, Washington, D. C.

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REPORT OF BVT. MAJ. GEN. J. C. DAVIS.

HEADQUARTERS DEPARTMENT OF THE COLUMBIA,
Portland, Oreg., September 1, 1874.

SIR: I have the honor herewith to submit the following short annual report of military affairs in this department during the past year:

The last annual report was dated the 1st of November, 1873; since that time no important movements of the troops have been required. At most of the garrisons they have remained quiet in barracks.

The changes of stations made are as follows:

The troops have been withdrawn from San Juan Island to Fort Townsend, Wash. Camp Warner, Oreg., has been abandoned, and the troops, with public property, removed to Camp Bidwell, Cal. These changes were made in the interest of economy, due regard being paid to the object for which troops are kept by the Government—the protection of settlers, and for the support of the Indian agents in the performance of duties.

The field movements of the troops are as follows: In March last, the Indian agent, Mr. Linville, at the Malheur reservation, became suspicious of the conduct of some of his people, and called upon the commanding officer at Camp Harney for a detachment of cavalry to assist and protect him in the execution of his duties. (See copy of letter of Mr. H. Linville, dated March 7, 1874, appended, marked A.) The request for troops was immediately complied with by Maj. Elmer Otis, First Cavalry, commanding at Camp Harney, and a detachment of twenty-four mounted men, with pack animals, was dispatched to the alarmed agency, under command of Lieut. C. C. Cresson, First Cavalry, an energetic, skillful young officer. This detachment attempted to reach the excited agency by the most direct route, but, owing to the accumulation of snow on the mountains which lay between, it was compelled to turn back. (See report of Lieutenant Cresson, dated March 27, 1874, marked B.) A second attempt by another route was successful; but, on reaching the agency, Lieutenant Cresson found the cause of alarm had been considerably exaggerated by the newly-installed agent. He was, however, ordered to remain there until further instructions. Lieutanant Cresson and detachment deserve great credit for the manner in which they prosecuted this mid-winter expedition.

Lieutenant Cresson, with his detachment, remained at the agency some six weeks; after which he returned to his post. (See his report, dated May 30, forwarded to War Department.)

About the middle of June last I left my headquarters, for the purpose of making a tour of inspection in that part of the department which is composed of Eastern Washington Territory and Northern Idaho. On my arrival at Fort Lapwai, I was informed by a delegation of citizens that the Indians had assembled in considerable numbers in Paradise and Hog Heaven Valley for the purpose of digging roots, hunting, and fishing, and that they were talking very saucily to the settlers, and had committed various trespasses among the farmers of the country.

I at once determined to take these places in my route. At the same time I was called upon by the Indian agent of the Lapwai reservation, who informed me that the Nez Percé Indians, over whom he was agent, were not acting by any means as he would have them. Many of them were showing signs of dissatisfaction and insubordination. Some of them had assumed an attitude of insolence toward him and the employés at the agency, which foreboded evil, if not actual hostilities.

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He had just learned that a large gathering of Indians would take place in the Nez Percé country, at Wee-ipe, on the 4th of July. He believed other Indian tribes were expected to be represented there at their "talk," and expressed a desire to be present, but thought the Indians would not allow him to remain unless supported by troops. At his request I ordered Capt. D. Perry, First Cavalry, with his company from Fort Walla Walla, to Fort Lapwai, for the purpose of accompanying and supporting him in the performance of his duties. If the Indians intended to meet there merely for pastime and enjoyment, the presence of troops in the vicinity need not interfere; if for evil purposes they would be in the right place.

After making the necessary arrangements to meet this requirement of the troops I proceeded with Capt. George B. Sanford's company to Hog Heaven and Paradise Valley. The agent, Mr. Monteith, accompanied me. We found the Indians there, as reported, in considerable numbers digging camas-root, hunting, fishing, horse-racing, gambling, insulting the citizens, and in some instances committing trespasses among the farmers, according to their views or whims. The approach of the troops put an end to the trouble and probably prevented bloodshed between the races.

In my opinion, the moving cause of this exhibition of ill-nature on the part of the Indians is to be found in the fact that these beautiful and fertile valleys are being rapidly occupied by an industrious and thrifty class of white farmers and stock-raisers. I could discover no other cause.

During the following month I made an extensive tour through the Indian country occupied by the Cœur d'Alenes, the Spokanes, Colvilles, Pend d'Oreilles, and other tribes. I found all friendly, and seemed to be well-disposed toward the whites. These Indians occupy one of the finest portions of our country. The valleys of Pine Creek, the Palouse, Hangman's Creek, the Spokane, Saint Joseph, and Cœur d'Alene Rivers, are very rich, and can be made exceedingly productive. Stock and grain of all kinds can be raised in the greatest abundance. The most of these localities are well timbered and well watered.

The climate is exceedingly healthy, and not very cold in winter, and the summers are delightful. The Indians in a few places are making feeble efforts to cultivate and raise stock; but the greater part of them subsist by fishing and hunting, and give but little evidence of ever changing their mode of living.

On my return to Fort Lapwai I found that Mr. Monteith with Captain Perry had returned from Wee-ipe. They found the Indians there in considerable numbers, about 1,200. The troops did not interfere with the council, but their presence there for about ten days had the effect to disperse it.

General dissatisfaction, however, seemed to prevail among the non-treaty Nez Percés. This was particularly the case with Joseph's band, the claimants of Wallowa Valley.

In compliance with the request of the agent, I also sent Maj. John Green, First Cavalry, an officer of great prudence and experience in Indian matters, with two companies of the First Cavalry, to keep the peace. These troops remained there until the 1st instant. (See letter of Captain Whipple, First Cavalry, marked and appended.) I do not fear any immediate trouble with this Indian and his band, but would recommend the early attention of the Indian Department to them; also O-che-o's band, near Camp Warner. I have reported on this band

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before, and will now only ask attention to previous suggestions on the subject. He should be made to remain on his reservation more than he has been doing.

The Indians in Alaska have generally remained quiet, but still I would recommend that an armed vessel be sent along the coast, occasionally at least; particularly at the mouth of the Stikine River and Sitka, where the white population is increasing.

The two companies of troops, Fourth Artillery, stationed at Sitka have been relieved, after two years' service there, by two companies of the same regiment, and sent to San Francisco, Cal.

It affords me pleasure to invite attention to the reports of the chiefs of the different staff departments, appended.

By reference to the reports of Major Batchelder, chief quartermaster, and Lieutenant Boyle, chief commissary of subsistence, it will be seen that there has been made considerable reduction of expenses in these departments, they having both labored with a view to retrenchment. It affords me pleasure to call attention to their success.

The duties of the adjutant-general's office, under the charge of Maj. H. Clay Wood, have been efficiently performed throughout, in all its various requirements.

The medical department has been successfully managed, under Surgeon Geo. E. Cooper, during the first part of the year, the latter part under Surgeon E. J. Bailey.

The paymaster's department, owing to the limited number of officers on duty, has been pushed very hard to meet its duties. Special attention is invited to Colonel Eaton's report. The work is too great for the number of paymasters now on duty.

I relinquish command of the department to Brig. Gen. O. O. Howard this day.

I am, sir, very respectfully, your obedient servant,

JEFF. C. DAVIS,
Brevet Major-General Commanding.

The ASSISTANT ADJUTANT-GENERAL,
Military Division of the Pacific, San Francisco, Cal.

REPORT OF BRIG. GEN. GEORGE CROOK.

HEADQUARTERS DEPARTMENT OF ARIZONA,
Prescott, August 31, 1874.

SIR: With the close of regular operations in the field, it was my intention to continue to concentrate the troops from small to large garrisons, as I had already commenced to do at the date of my last annual report; up to the present time, however, I have not been able to do much in that way, but trust this fall some of the smaller posts may be dispensed with and their garrisons sent to the larger, thus making another important reduction in the expenses of the department.

The garrison of Camp Beale's Springs, owing to the removal of the Hualpai Indians, was transferred to the La Paz on the Colorado Indian reservation.

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It is to be hoped that neither Indians nor troops will long be compelled to remain in that barren desert, where for over six months of the year the mercury marks a temperature of from 100° to 120° F. in the shade.

Vegetation is almost entirely dependent upon the uncertain overflow of the Colorado, and when this fails, as it frequently does, it leaves the soil a barren, burning desert for the entire year. With this exception the several posts and their garrisons remain nearly the same as they were a year ago, except as they are temporarily reduced by the exchange of the Eighth with the Twenty-third Infantry, a movement now in progress.

The change in the locations of the garrisons of Camps Grant and Lowell, which took place last summer, has had a salutary effect upon the health of the troops, which has been gradually improving for the past three years, and shows a marked melioration during the past year, as hereinafter shown in the report of the medical director. The number of Indian scouts will be reduced to below one hundred as soon as instructions, recently promulgated, can reach the different reservations where they are employed.

INDIANS.

After the closing operations against straggling, but organized bands of renegades, mentioned in my last annual report, the officers in charge of scouts on the several reservations were directed to instruct the Indians that their future depended in a great measure upon themselves; that in communities of white people, offenders against law and the general good were followed and punished by whites, and that it frequently occurred that even the relatives of the offenders were among the executors of justice.

Every effort has been made to secure the adjustment of differences and the punishment of criminals by members of the same tribe, and the result has been that all the disturbing elements are gradually being separated from what may be called the law and order parties, and the commission of any outrage, either upon their own or our people, is followed by prompt punishment at the hands of the Apaches themselves.

Each warrior is numbered and carries with him, day and night, his metal check, with the number and designation of his tribe stamped thereon. A corresponding record of each, the number of members in his family and his own personal description, is also kept by the officer in charge, and as issues are made on these checks the Indians themselves are careful not to lose them and to be well known to the officer as No. —.

This careful watch over all their movements, and the discipline and efficiency of the police force, composed as it is of the scouts who were so efficient in the campaigns, render it almost impossible for an Indian belonging on one of these reservations to commit any dereliction, however trifling, without its being traced directly to him.

Some of the worst characters while hostile have, by the careful management and discipline to which they have been subjected as soldiers, become the most useful and reliable Indians we have, and have been most efficient in hunting up and punishing the few who by persistent course of crime have been regarded and treated as

OUTLAWS.

Delt-che, Cochenay, Chuntz, and Chan-Deisi.—These Indians, noted characters, whose deeds had made them a terror not only to whites, but to the Indians themselves, have finally, after long careers of crime,

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met the fate they so richly deserved. At the time peace was declared with the tribes to which they belonged, they were well known as the perpetrators of numberless terrible crimes, but, as they surrendered with the rest, they shared in the general amnesty for all past offenses.

It was not long, however, before it was apparent that they had no real intention of remaining upon the reservations, but simply used them as conveniences upon which to secure supplies of arms and ammunition. Each in his different tribe stirred up and provoked dissension and trouble among their own people, who through their advice were led into outbreaks that necessarily brought on their own destruction, until finally the Indians themselves lost all confidence in them, and instead of followers became their untiring pursuers.

Chan-Deisi was the Apache who shot and killed Lieutenant Almy at the San Carlos agency last year, since which time he has been an outlaw, hovering around in the mountain gorges and cañons with which Arizona abounds, and which afford such facilities for hiding that it was for a long time a question whether the Indians could capture or kill him, but they finally succeeded, and he was killed on or about the 12th of June.

Cochenay and Chuntz were also concerned in the murder of Lieutenant Almy, and parties to the plot to massacre all the whites on the reservation at the same time. They, with a small party of followers, murdered two teamsters in January last on the reservation near the agency, and thence crossing to near Old Camp Grant, massacred a family, practicing upon them tortures too revolting and horrible to detail; this, after repeated most solemn promises of peace and friendship. They could and did slip in upon the reservations quietly, stir up such murderous spirits as they desired, and got away before their presence was known, generally taking with them some ill-advised warriors of similar propensities.

The outbreak at the San Carlos in January last was instigated by them, and might have assumed proportions that would have put in jeopardy all that had been done, but for the prompt and decisive movements of the troops, the officers in command showing great skill and energy in the emergency, crushing it in the bud.

In view of these things, I concluded that there was no other way but to secure these outlaws at any price, and when their followers began to come in to their old reservations, after suffering severe losses at the hands of the troops, and begged to be allowed to return, I instructed the officers in charge that they would be allowed to do so upon condition only that they brought in these savages either dead or alive; so that one after another of their followers deserted and joined the Indians, hunting them until finally they were both killed—Cochenay, on the 26th of May, and Chuntz on the 25th of July.

It should be observed that these Indians so encamped with their followers that in almost every case of attack by the troops and allies who were constantly in pursuit, the blow fell upon the latter, and the leaders got away, until these followers began to see that they were the great sufferers, after which desertions to our side became more numerous, and it was through these desertions that we were finally enabled to get the ringleaders.

Delt-che.—This savage has been a terror to Arizona for many years. It has been notorious that he has never kept any promise he has made, and yet, from some unexplained cause, he has not only escaped death when others of his band have been killed, but has always succeeded in ringing himself in when others were surrendering in such a manner

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that, although his entire course showed there was no dependence to be placed upon him, (for his name has long been, even among his own people, the synonym for liar,) he could not be arrested without the appearance of bad faith; so he has, at one time or another, been a "peaceful" suppliant for pardon at all the agencies and military posts in Eastern, Central, and Northern Arizona, and each time has signalized his departure, which usually followed hard upon his surrender, by thefts of cattle, horses, and other property, or the cold-blooded massacre of some unsuspecting family residing near.

A short time since, while he and his people were residing "on terms of peace" on the Verde reservation, he with his warriors surrounded all the whites on the reservation, and would undoubtedly have put them to death but for the timely siding with our people of a number of scouts and other friendly Indians, who had learned long since that he could not be true to friend or foe.

With the exception of one visit since, for the purpose of persuading a few more to join him, this is believed to have been his last visit on the Verde, and he was killed by his own people near Turret Mountain, on or about the 27th ultimo.

RESERVATIONS.

This, I believe, closes out all the leading elements of disturbance at Verde, San Carlos, and Apache, and if the Indians on these reservations are properly managed, kept at work, furnished with seeds and implements, and their present interest in raising stock and making themselves homes encouraged, there will be no further trouble with them, and they will gradually become self-supporting.

Above all things they should not be encouraged in idleness, and the issue of supplies at Government expense should be gradually withdrawn, so that in time, instead of lazy, worthless vagabonds, dependent on the Government for every mouthful they eat, they will be industrious communities, earning their own subsistence before they consume it, as I endeavor to impress upon them white people are supposed to do.

The large reservations set apart for these Indians at the White Mountain, San Carlos, and Verde, embrace some of the finest agricultural land in the Territory; and the Indians have, under the officers in charge of them, put in reasonable crops the past year, and are preparing for much larger fields next year. At the Verde, under the instruction of an officer familiar with engineering, they have constructed, without expense to the Government, a fine irrigating canal, have built an excellent store-house, and are making for themselves comfortable houses.

With more comfortable shelters, improved habits and acclimatization, the sickness mentioned in my last annual report as prevailing on this reservation has nearly all disappeared, and, as the sickly season comes on, the officer in charge will cause them to make temporary camps on the higher land, so that there will be no trouble from that source in the future. There are now on the Verde reservation about fifteen hundred Indians; they have been among the worst in Arizona; but, if the Government keeps its promise to them, that it shall be their home for all time, there will be no difficulty in keeping them at peace and engaged in peaceful pursuits.

I sincerely hope that the interests that are now at work to deprive these Indians of this reservation will be defeated; but if they succeed, the responsibility of turning these fifteen hundred Apaches loose upon the settlers of Arizona should rest where it belongs.

Capt. William H. Brown, Fifth Cavalry, Capt. George M. Randall,

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Twenty-third Infantry, First Lieut. John B. Babcock, Fifth Cavalry, First Lieut. William F. Rice, Twenty-third Infantry, First Lieut. Edward W. Ward, Fifth Cavalry, and Second Lieut. Walker S. Schuyler, Fifth Cavalry, are the officers who have been in charge of the management of the Indians on these reservations. Their positions have been most important, the duties onerous and dangerous, and they have shown themselves equal to the emergencies that have been constantly arising.

I respectfully invite attention to the letters I have already forwarded in regard to these officers, and the recommendations that have been made from time to time of other officers and enlisted men for services in the different scouts made during the year, as well as in the campaign of 1872–'73.

The Hualpais and the Colorado reservation.—The order from the Indian Department for the removal of these Indians from their old home to the Colorado reservation came in January. I was already well advised of the reluctance these Indians had to going to the Colorado, but after consulting them I hoped they would go without trouble, and the movement was to take place January 26, when, all at once, the entire band left, and went into the mountains, declaring that sooner than go they would fight to the death.

Troops were immediately dispatched to attack them wherever found. A few depredations were committed, and there was every indication that this warlike band would make a great portion of Northwestern Arizona uninhabitable.

It transpired that just at this time the whole country was flooded and almost impassable, so there was some delay in getting the troops into position; in the mean time, through the personal exertions of Captain Byrne, commanding Camp Beale's Springs, prompted also by fear of the troops, they all came in and agreed to go peaceably to the Colorado, which they did. They have now been on that reservation four months, and their condition is deplorable; being mountain Indians, the heat of the place, the mercury ranging from 100° to 120° in the shade several months in the year, with a want of proper diet, has produced an eruptive disease, which seems to have become almost epidemic. Many of their little children are nearly blind from an affection of the eyes, the result, in a great measure, of the glare of the sun and drifting sand.

The horses they have purchased to breed from have nearly half of them perished from starvation.

Products of the soil are dependent upon the uncertain overflow of the river; so that, although I believe they fully intended to make the best of what they regarded as an imposition upon them, and went to work quite willingly, the failure of the overflow, involving a total loss of what few seeds they planted, together with the sickness of their families, has disheartened them to such a degree that they are continually appealing to the commanding officer of the troops stationed over them to know how long I (meaning me) am going to keep them there; and say if they have got to remain on the Colorado and be roasted to death, or fight even their old friends and allies, they prefer the latter. The country they will operate in is being opened up by mining experts, who are scattered all through it, and the loss of life will be great if the Hualpais carry out their threats.

Attention is invited to the accompanying papers (Appendix B) having reference to the subject.

Chiricahua.—Although the Indians on this reservation have never been under my control, the complaints that have been made by the Mexican authorities of Sonora, of depredations committed by Indians

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from it, have necessarily called forth reports and correspondence, from time to time, to which I desire to briefly allude. It is to be observed that these Indians have never been subjected to roll-calls for the purpose of determining their number or their whereabouts.

The agent claims to have counted them in their rancherias, an absurdity which is apparent on its face, as any person familiar with the subject must know that the approximation even to the correct number of a band of Indians scattered around in the rocks and mountains of a large reservation is an impossibility.

There is no doubt but the people residing in Sonora have the greatest cause of complaint. Indeed, it is difficult to make the Mexican element, which comprises so large a portion of the population of this Territory, believe that it is not designed on the part of our Government or its authorities, and it has required no little management by the governor of Sonora and Governor Safford, of this Territory, who have both freely communicated with me on the subject, to prevent counter-raids being made into our Territory by Mexicans residing near the border. As it is, there has been a great number of murders, and applications for troops to be stationed along the border have been frequent, which, owing to the limited number of troops in the department, I have not been able to comply with. If, however, the raids attributed to the Apaches from the Chiricahua continue to be made on Sonora, we should be prepared for complications of a serious character.

Undoubtedly the good offices of their excellencies Don Yguacio Presquiera, governor of Sonora, and A. B. K. Safford, governor of Arizona, have averted these troubles, due acknowledgment of which services I have the honor to make.

QUARTERMASTER'S DEPARTMENT.

The complete detailed report of the chief quartermaster of the department herewith submitted, marked C, shows that prices for transportation, as well as of all kinds of stores furnished from the products of the country, remarked in my last annual report as already on the wane, have a continued downward tendency that will perceptibly diminish the annual estimates for the administration of the department.

SUBSISTENCE DEPARTMENT.

The accompanying report of the chief commissary of subsistence, marked D, also shows that some of the supplies for this department have been advantageously purchased from the products of the country, and I think if the present peace with the Apaches remain unbroken, there will be a great reduction in the prices of all kinds of meats furnished the troops in the future.

The supplies of subsistence furnished the troops, as well as stores for sales to officers and enlisted men, have been of excellent quality and promptly and liberally supplied.

The recommendation of the chief commissary that certain articles for sales be added to the list is concurred in.

TELEGRAPH-LINE.

The telegraph-line connecting San Diego, Yuma, Tucson, and Prescott has already been in successful operation ten months, and when the proposed extension, authorized by the last Congress, from this point to Camp Apache, shall have been furnished, the revolution already commenced in the manner of communicating orders will be complete; the concentration and movement of troops being a matter of hours only,

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where before it required days and weeks, the commander handling his troops from any point on the line with ease and rapidity; and successful outbreaks by the Indians will be next to an impossibility. Probably few equal expenditures by Congress will show correspondingly favorable results.

MEDICAL DEPARTMENT.

The medical director's report shows the urgent necessity for hospitals at Camp Apache and Fort Whipple, the completion of that at Camp Lowell, and repairs to those at Camp McDowell, Verde, and Fort Yuma, and as the proper plans and estimates have already been forwarded, I trust his recommendation will receive that attention the importance of the subject demands. (See appendix marked E.)

PAY DEPARTMENT.

Payments continue to be made as heretofore by paymasters stationed, respectively, at Prescott and Tucson. It is my intention, however, to have both these officers stationed here, and make the payments from this point in order to utilize the transportation.

The chief paymaster of the department, by whom the garrisons of Fort Yuma and Yuma Depot are paid, still remains in San Francisco. (See appendix marked F.)

ENGINEER DEPARTMENT.

A great deal of valuable work has been performed by the officers of the department, under the supervision of the officer in charge, through whose energy, and the promptness with which the calls upon the engineer officers at division headquarters have been met, many valuable maps of hitherto unknown sections have been published. (See appendix marked G.)

INSPECTION.

Besides the regular inspections by the department inspector, Colonel Jones, of the Inspector-General's Department, has made a tour of inspection in the department during the year. For details and recommendations see the department inspector's report. (See appendix marked H.)

CONCLUSION.

In conclusion, I mention the material prosperity which is apparent in the Territory as the direct result of peace with the Apaches. It is to be hoped that there may be no mistakes in their management that will disturb this condition, for an Indian war, deplorable at all times, is much more to be deplored when it is the result of violated faith on the part of the Government or its agents.

I am, sir, very respectfully, your obedient servant,

GEORGE CROOK,
Brigadier-General, Commanding Department.

The ASSISTANT ADJUTANT-GENERAL,
Military Division of the Pacific, San Francisco, Cal.

Official:
GEO. CROOK,
Brigadier-General, Commanding Department.

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REPORT OF THE ADJUTANT-GENERAL.

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UNITED STATES,

B.—GENER

	Chief trumpeters.	Ordnance-sergeants.	Hospital-stewards.	Commissary-sergeants.	Battalion sergeant-majors.

General officers				
Military secretary to the Lieutenant-General				
Aids-de-camp to general officers				
Adjutant-General's Department				
Inspectors-general				
Bureau of Military Justice				
Quartermaster's Department				
Subsistence Department				
Medical Department				
Pay Department				
Corps of Engineers				
Ordnance Department				
Chief Signal Officer				
Post-chaplains				
First Regiment of Cavalry				
Second Regiment of Cavalry				
Third Regiment of Cavalry				
Fourth Regiment of Cavalry				
Fifth Regiment of Cavalry				
Sixth Regiment of Cavalry				
Seventh Regiment of Cavalry				
Eighth Regiment of Cavalry				
Ninth Regiment of Cavalry				
Tenth Regiment of Cavalry				
Aggregate of cavalry				
First Regiment of Artillery				
Second Regiment of Artillery				
Third Regiment of Artillery				
Fourth Regiment of Artillery				
Fifth Regiment of Artillery				
Aggregate of artillery				

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								TOTAL.		MILITARY ACADEMY.		
Musicians.	Farriers and blacksmiths.	Artificers.	Saddlers.	Wagoners.	Privates—first-class.	Privates—second-class.	Privates.	Commissioned.	Enlisted.	Professors.	Cadets.	Aggregate.
.....	.....	.....	.....	...	.....	.....	.....	11	.....	.....	.....	11
.....	.....	.....	.....	...	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	...	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	...	.....	.....	.....	16	.....	.....	.....	16
.....	.....	.....	.....	...	.....	.....	.....	8	.....	.....	.....	8
.....	.....	.....	.....	...	.....	.....	.....	10	.....	.....	.....	10
.....	.....	.....	.....	...	.....	.....	.....	65	.....	.....	.....	65
.....	.....	.....	.....	...	.....	.....	.....	26	.....	.....	.....	26
.....	.....	.....	.....	...	.....	.....	.....	154	219	.....	.....	373
.....	1	.....	.....	...	.....	.....	.....	46	.....	.....	.....	46
7	.....	.....	.....	...	137	116	.....	104	315	.....	.....	419
.....	.....	.....	.....	...	195	113	.....	56	419	.....	.....	475
.....	.....	.....	.....	...	.....	.....	.....	1	.....	.....	.....	1
.....	.....	.....	.....	...	.....	.....	.....	29	.....	.....	.....	29
.....	16	.....	10	...	.....	.....	522	42	666	.....	.....	708
.....	15	.....	12	3	.....	.....	616	43	784	.....	.....	827
.....	22	.....	10	2	.....	.....	577	44	742	.....	.....	786
.....	22	.....	11	8	.....	.....	538	42	720	.....	.....	762
.....	22	.....	11	1	.....	.....	678	43	852	.....	.....	895
.....	19	.....	11	8	.....	.....	686	41	856	.....	.....	897
.....	24	.....	12	6	.....	.....	670	43	841	.....	.....	884
.....	19	.....	9	1	.....	.....	687	42	853	.....	.....	895
.....	19	.....	11	3	.....	.....	578	43	737	.....	.....	780
.....	20	.....	10	6	.....	.....	726	43	888	.....	.....	931
.....	198	.....	107	38	.....	.....	6,278	426	7,939	.....	.....	8,365
19	.....	11	.....	10	.....	.....	385	54	530	.....	.....	584
22	.....	13	.....	...	.....	.....	506	56	641	.....	.....	697
24	.....	8	.....	2	.....	.....	466	56	603	.....	.....	659
22	.....	6	.....	5	.....	.....	470	56	610	.....	.....	666
20	.....	4	.....	2	.....	.....	427	56	547	.....	.....	603
107	.....	42	.....	19	.....	.....	2,254	278	2,931	.....	.....	3,209
18		2		5			402	34	507	.....	.....	541

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REPORT

OF

THE ADJUTANT-GENERAL.

Memorandum of annual returns.

1. Table showing the "Organization of the Regular Army," marked A.
2. General return or exhibit of the actual strength of the Regular Army, marked B.
3. Statements of the "Position and distribution of troops," as follows:

Military Division of the Missouri, comprising the Departments of the Missouri, the Platte, Dakota, and Texas, marked C.

Military Division of the Atlantic, marked D.

Military Division of the Pacific, comprising the Departments of California, the Columbia, and Arizona, marked E.

Military Division of the South, comprising the Departments of the South and the Gulf, marked F.

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C.—*Position and distribution of troops in the Military Division of the Missouri, commanded returns on file in the Adjutant-*

POSTS.	SITUATIONS.	COMMANDING OFFICERS.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Military secretary.	Aids-de-camp.	Adjutant-General's Dep't.	Inspectors-general.
DEPARTMENT OF THE MISSOURI.				Division staff	1	1	2	1	1
Headquarters.....	Fort Leavenworth, Kans	Brig. Gen. John Pope....	...	Department staff.	1	..	3	1	..
Santa Fé, N. Mex ..	Headquarters 8th Cav. and District of N. Mex.	Col. J. I. Gregg, 8th Cav.	...	District staff	..	..	..	..	..
Fort Craig, N. Mex.	On the Rio Grande.....	Capt. E. W. Whittemore, 15th Inf.	1	15th Inf.....	..	..	..	..	..
Fort McRae, N. Mex.	35 miles south of Fort Craig.	Capt. A. B. Kauffman, 8th Cav.	1	8th Cav.....	..	..	..	..	..
Fort Selden, N. Mex	On the Rio Grande.....	Maj. N. W. Osborne, 15th Inf.	2	15th Inf.....	..	..	..	..	..
Fort Bayard, N. Mex.	Near Pinos Altos	Lt. Col. T. C. Devin, 8th Cav.	4	....do	..	..	..	..	..
Fort Stanton, N. Mex.	On the Rio Bonita	Maj. D. R. Clendenin, 8th Cav.	2	8th Cav.....	..	..	..	..	..
Fort Tularosa, N. Mex.	114 miles west of Fort Craig.	Capt. Geo. Shorkley, 15th Inf.	2	15th Inf.....	..	..	..	..	..
Fort Union, N. Mex	5 miles from the Rio Moro.	1st Lieut. J. W. Eckles, 15th Inf.	..1	....do	..	..	..	..	..
Fort Wingate, N. Mex.	At the headwaters of the Rio Puerco.	Capt. J. P. Brown, 15th Inf.	..1	....do	..	..	..	..	..
Fort Garland, Colo.	On Utah Creek, 150 miles from Kit Carson.	Capt. Horace Jewett, 15th Inf.	..1	....do	..	..	..	..	..
Fort Lyon, Colo....	52 miles from Kit Carson	Col. C. H. Smith, 19th Inf	2	19th Inf.....	..	..	..	..	..
Fort Dodge, Kans..	96 miles southwest of Hays City.	Capt. J. H. Bradford, 19th Inf.	4	....do	..	..	..	..	..
Fort Hays, Kans...	Near Hays City, on K. P. R. R.	Col. James Oakes, 6th Cav.	1	6th Cav.....	..	..	..	..	..
Fort Leavenworth, Kans.	3 miles above Leavenworth City.	Capt. D. H. Brotherton, 5th Inf.	2	5th Inf.....	..	..	..	..	..
Fort Larned, Kans.	50 miles from Hays City.	Capt. W. J. Lyster, 19th Inf.	2	19th Inf....	..	..	..	..	..
Fort Riley, Kans...	At junction of Pawnee and Smoky Hill Forks.	1st Lieut. Geo. McDermott, 5th Inf.	...	5th Inf.....	..	..	..	..	..
Fort Wallace, Kans	2 miles from Wallace Station, on K. P. R. R.	Maj. H. A. Hambright, 19th Inf.	1	19th Inf.....	..	..	..	..	..
Fort Gibson, Ind. T.	Near junction of Neosho and Arkansas Rivers.	2d Lieut. T. M. Woodruff, 5th Inf.	...	5th Inf.....	..	..	..	..	..
Camp Supply, Ind. T	Near junction of Wolf and Beaver Creeks.	Lt. Col. W. H. Lewis, 19th Inf.	4	6th Cav. and 19th Inf.	..	..	..	..	..
In the field	On expedition to Indian Territory.	Col. N. A. Miles, 5th Inf	12	6th Cav. and 5th Inf.	..	..	..	..	..
Do.....	At Cheyenne and Arapahoe agency.	Lt. Col. T. H. Neill, 6th Cav.	5	6th Cav. and 5th Inf.	..	..	..	..	..
Do.....	On expedition in Northeastern New Mexico.	Maj. A. J. Alexander, 8th Cav.	3	8th Cav.....	..	..	..	..	..
Do.....	On expedition to Indian Territory.	Maj. W. R. Price, 8th Cav.	4	8th Cav.....	..	..	..	..	..
Total.....	.....	.....	55	.....	1	..	3	1	..
DEPARTMENT OF DAKOTA.									
Headquarters.....	Saint Paul, Minn.....	Brig. Gen. A. H. Terry ..	...	Department staff.	1	..	3	1	..
Fort Snelling, Minn	5 miles below Saint Paul.	Col. George Sykes, 20th Inf.	2	20th Inf.....	..	..	..	..	..
Fort Ripley, Minn..	47 miles north of Sauk Rapids.	Capt. J. C. Bates, 20th Inf.	2	....do	..	..	..	..	..
Fort Abercrombie, Dak.	12 miles north of Breckinridge.	Col. T. L. Crittenden, 17th Inf.	2	17th Inf.....	..	..	..	..	..

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by Lieutenant-General P. H. Sheridan, headquarters Chicago, Illinois, taken from the latest General's Office, 1874.

PRESENT.																					ABSENT.						PRESENT AND ABSENT.		
Bureau of Military Justice.	Quartermaster's Department.	Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Ordnance Department.	Post-chaplains.	Military storekeepers.	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and reg'tal staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
..	2	3	1	..	1	..	..	..	..	..	1	....	..	..	..	..	12	12	24	..	..	..	..	....	....	....	12	12	24
1	3	2	1	3	1	..	..	..	..	1	..	....	..	..	..	..	10	14	24	..	..	..	..	....	....	....	14	10	24
..	1	..	1	3	..	..	..	..	1	..	..	....	..	1	1	...	10	8	18	..	..	..	..	....	1	1	9	10	19
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	57	3	60	..	..	..	..	1	...	1	3	58	61
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	72	3	75	..	..	..	..	1	...	1	3	73	76
..	..	..	1	..	..	..	..	..	..	..	1	2	..	..	..	4	107	8	115	..	..	..	..	1	..	1	8	108	116
..	..	..	1	..	..	..	..	..	..	1	..	3	..	..	..	5	253	10	263	..	..	1	3	3	4	7	14	256	270
..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	3	128	5	133	..	..	1	1	2	2	4	7	130	137
..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	3	106	5	111	..	..	..	1	....	1	1	6	106	112
..	1	..	1	..	..	..	1	..	..	..	..	....	..	..	..	3	61	6	67	..	..	1	..	5	1	6	7	66	73
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	84	3	87	..	..	..	..	....	....	....	3	84	87
..	..	..	1	..	..	..	..	..	..	..	..	1	..	1	..	2	80	5	85	..	..	..	..	2	...	2	5	82	87
..	..	..	1	..	..	..	1	..	1	..	..	1	..	1	1	3	131	9	140	..	..	1	1	3	2	5	11	134	145
..	1	..	1	..	..	..	..	..	..	..	..	1	..	..	..	7	157	10	167	..	..	3	1	8	4	12	14	165	179
..	..	..	1	..	..	..	..	..	1	..	..	1	..	1	1	2	76	7	83	..	..	..	..	....	....	....	7	76	83
..	..	..	1	..	..	..	1	1	..	..	..	2	..	..	1	4	100	10	110	..	..	1	..	....	1	1	11	100	111
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	4	111	6	117	..	..	1	..	....	1	1	7	111	118
..	..	..	..	..	..	..	1	..	..	..	..	....	..	..	..	1	10	2	12	..	..	..	..	....	....	....	2	10	12
..	..	..	..	..	..	..	1	..	..	..	1	1	..	..	..	1	55	4	59	..	..	..	1	....	1	1	5	55	60
..	..	..	..	..	..	..	..	..	..	..	..	....	1	..	..	1	9	2	11	..	..	..	..	....	....	....	2	9	11
..	..	..	1	..	..	..	..	..	..	1	..	2	..	..	..	6	214	10	224	1	..	2	2	3	5	8	15	217	232
..	..	..	2	..	..	..	..	..	1	..	2	9	..	1	..	20	782	35	817	..	..	2	1	20	3	23	38	802	840
..	..	..	..	..	..	..	..	..	..	1	..	3	..	..	..	4	156	8	164	..	..	1	2	27	3	30	11	183	194
..	..	..	..	..	..	..	..	..	..	..	1	3	..	..	..	5	184	9	193	..	..	..	..	....	....	....	9	184	193
..	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	5	238	8	246	..	..	2	2	....	4	4	12	238	250
1	6	2	14	6	1	..	5	1	4	4	7	38	1	5	4	89	3,191	190	3,381	2	..	16	15	76	33	109	223	3,267	3,490
1	2	2	1	5	1	..	..	1	..	1	..	....	..	..	..	..	12	16	28	..	..	..	..	....	....	....	16	12	28
..	..	..	1	..	..	..	..	..	1	..	..	1	..	1	1	3	123	8	131	..	..	1	1	....	2	2	10	123	133
..	..	..	..	..	..	..	1	..	..	..	..	2	..	..	..	3	85	6	91	..	..	..	1	3	1	4	7	88	95
..	..	..	1	..	..	..	..	..	1	..	..	2	..	1	1	4	111	10	121	..	..	..	..	4	..	4	10	115	125

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C.—*Position and distribution of troops in the*

POSTS.	SITUATIONS.	COMMANDING OFFICERS.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Military secretary.	Aides-de-camp.	Adjutant-General's Dep't.	Inspectors-General.
DEPARTMENT OF DAKOTA—Cont'd.									
Fort Wadsworth, Dak.	On Kettle Lake	Capt. E. P. Pearson, 20th Inf.	2	17th Inf.	..	..	..	..	..
Fort Seward, Dak.	At crossing of James River by N. P. R. R.	Capt. J. H. Patterson 20th Inf.	1	20th Inf.	..	..	..	..	..
Fort Totten, Dak.	On southeastern shore of Devil's Lake.	Lieut. Col. L. C. Hunt, 20th Inf.	4	20th Inf. and 7th Cav.	..	..	..	..	..
Fort Pembina, Dak	On Red River of the North	Maj. J. E. Yard, 20th Inf.	3	20th Inf.	..	..	..	..	..
Fort Sully, Dak.	On Missouri River, 318 miles above Sioux City, Iowa.	Capt. R. H. Offley, 1st Inf.	3	1st Inf	..	..	..	..	..
Fort Rice, Dak	50 miles above Edwinton	Maj. J. G. Tilford, 7th Cav	5	7th Cav. and 1st Inf.	..	..	..	..	..
Fort A. Lincoln, Dak.	At crossing of Missouri River by N. P. R. R.	Lieut. Col. G. A. Custer, 7th Cav.	9	7th Cav., 6th and 17th Inf.	..	..	..	..	..
Fort Stevenson, Dak	On Missouri River, 125 miles above Fort Rice.	Lieut. Col. D. Huston, jr., 6th Inf.	2	6th Inf.	..	..	..	..	..
Fort Randall, Dak	On Missouri River, 146 miles above Sioux City, Iowa.	Lieut. Col. P. Lugenbeel, 1st Inf.	5	1st Inf	..	..	..	..	..
Fort Buford, Dak.	On Missouri River, 300 miles above Fort Stevenson.	Col. W. B. Hazen, 6th Inf.	6	6th Inf.	..	..	..	..	..
Cheyenne agency, Dak.	7 miles above Fort Sully	Capt. Carlile Boyd, 17th Inf.	2	17th Inf.	..	..	..	..	..
Camp Hancock, Dak	At Edwinton	Capt. C. E. Clarke, 17th Inf	1	do	..	..	..	..	..
Lower Brule agency, Dak.	80 miles above Fort Randall.	Capt. I. D. De Russy, 1st Inf.	1	1st Inf	..	..	..	..	..
Fort Ellis, Mont.	3 miles from Bozeman	Maj. N. B. Sweitzer, 2d Cav.	5	2d Cav. and 7th Inf.	..	..	..	..	..
Fort Benton, Mont	On Missouri River, 143 miles north of Helena.	Maj. Guido Ilges, 7th Inf.	1	7th Inf.	..	..	..	..	..
Fort Shaw, Mont.	8 miles north of Helena	Col. John Gibbon, 7th Inf.	6	do	..	..	..	..	..
Camp Baker, Mont.	18 miles northeast of Diamond City.	Lieut. Col. C. C. Gilbert, 7th Inf.	2	do	..	..	..	..	..
Grand River agency, Dak.	90 miles above Fort Sully	Capt. Edward Collins, 17th Inf.	2	17th Inf.	..	..	..	..	..
Total			66		1	..	3	1	..
DEPARTMENT OF THE PLATTE.									
Headquarters	Omaha, Nebr	Brig. Gen. E. O. C. Ord	..	Department staff.	1	..	3	1	..
Omaha Barracks, Nebr.	4 miles above Omaha City.	Lt. Col. R. I. Dodge, 23d Inf.	6	23d Inf.	..	..	..	..	..
North Loup, Nebr		Capt. Samuel Munson, 9th Inf.	1	9th Inf.	..	..	..	..	..
Fort McPherson, Nebr.	6 miles south of McPherson Station.	Maj. N. A. M. Dudley, 3d Cav.	3	3d Cav.	..	..	..	..	..
Sidney Barracks, Nebr.	Near Sidney Station, on U. P. R. R.	Lt. Col. H. A. Morrow, 13th Inf.	3	3d Cav. and 13th Inf.	..	..	..	..	..
Fort D. A. Russell, Wyo.	On the line of U. P. R. R.	Col. J. J. Reynolds, 3d Cav.	5	3d Cav. and 23d Inf.	..	..	..	..	..
Fort Sanders, Wyo	do	Lt. Col. A. G. Brackett, 2d Cav.	2	4th and 13th Inf.	..	..	..	..	..
Fort Fred. Steele, Wyo.	do	Capt. E. W. Clift, 13th Inf.	4	13th Inf.	..	..	..	..	..
Fort Bridger, Wyo	10 miles south of Carter's Station, on U. P. R. R.	Col. F. F. Flint, 4th Inf	3	4th Inf.	..	..	..	..	..
Camp Stambaugh, Wyo.	67 miles from Point of Rocks, on U. P. R. R.	Capt. D. S. Gordon, 2d Cav.	2	2d Cav. and 13th Inf.	..	..	..	..	..

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Military Division of the Missouri, &c.—Continued.

PRESENT.																						ABSENT.									PRESENT AND ABSENT.		
Bureau of Military Justice.	Quartermaster's Department.	Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Ordnance Department.	Post-chaplains.	Military storekeepers.	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and regtal staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.				
..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	3	94	5	99	..	1	..	1	2	2	4	7	96	103				
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	47	3	50	..	..	..	..	..	..	..	3	47	50				
..	..	..	..	..	..	..	..	..	..	1	1	3	..	..	..	6	241	11	252	..	..	1	2	4	3	7	14	245	259				
..	..	..	..	1	..	..	..	1	..	..	1	3	..	..	..	4	115	8	123	..	..	..	..	5	..	5	8	120	128				
..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	5	151	9	160	..	..	1	..	3	1	4	10	154	164				
..	1	..	1	..	..	..	..	..	..	..	2	5	..	..	..	8	338	17	355	..	..	..	1	1	1	2	18	339	357				
..	1	..	1	..	..	..	..	..	..	1	..	6	..	1	1	10	617	21	638	..	1	3	7	6	11	17	32	623	655				
..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	3	107	5	112	..	..	1	1	4	2	6	7	111	118				
..	..	..	1	..	..	..	1	..	..	1	..	5	..	1	1	5	257	15	272	..	2	..	5	2	7	9	22	259	281				
..	..	..	1	..	..	..	..	..	1	..	..	5	..	1	1	11	348	20	368	..	..	1	1	6	2	8	22	354	376				
.	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	2	101	4	105	..	..	..	1	3	1	4	5	104	109				
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	46	2	48	..	..	..	..	..	..	..	2	46	48				
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	53	3	56	..	..	..	..	1	..	1	3	54	57				
..	1	..	..	..	..	..	..	..	..	..	1	5	..	..	..	8	272	15	287	..	..	..	2	9	2	11	17	281	298				
..	..	..	..	1	..	..	..	..	..	..	1	1	..	..	..	2	50	5	55	..	..	..	..	2	..	2	5	52	57				
..	..	..	..	..	..	..	..	..	1	..	..	5	..	1	1	11	290	19	309	..	..	1	1	7	2	9	21	297	318				
..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	3	91	5	96	..	..	..	..	5	..	5	5	96	101				
..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	3	107	5	112	..	..	..	..	..	..	..	5	107	112				
1	5	2	9	5	1	..	3	1	4	6	6	56	..	6	6	99	3,656	212	3,868	..	4	9	24	67	37	104	249	3,723	3,972				
1	4	2	2	4	1	..	..	..	..	..	..	..	..	..	..	..	10	16	26	..	..	..	..	..	..	..	16	10	26				
..	..	..	1	..	..	..	1	..	..	1	1	4	..	1	1	11	307	21	328	..	1	2	1	10	4	14	25	317	342				
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	54	3	57	..	..	..	..	..	..	..	3	54	57				
..	..	..	1	..	..	..	..	..	..	..	1	3	..	..	..	5	194	10	204	..	..	..	1	3	1	4	11	197	208				
..	..	..	1	..	..	..	..	..	..	1	..	2	..	1	..	5	149	10	159	..	..	1	1	1	2	3	12	150	163				
..	..	..	1	..	..	..	..	..	1	..	2	4	..	1	1	7	281	17	298	1	..	1	2	7	4	11	21	288	309				
..	..	..	1	..	..	..	..	..	1	1	..	2	..	1	1	3	140	10	150	..	..	..	1	..	1	1	11	140	151				
..	..	..	1	..	..	..	..	..	..	..	..	4	..	..	1	5	208	11	219	..	..	..	2	7	2	9	13	215	228				
..	..	..	1	..	..	..	..	..	1	..	..	3	..	1	1	4	179	11	190	..	1	..	2	4	3	7	14	183	197				
.	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	3	104	5	109	..	..	..	1	..	1	1	6	104	110				

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C.—*Position and distribution of troops in the*

POSTS.	SITUATIONS.	COMMANDING OFFICERS.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Military secretary.	Aids-de-camp.	Adjutant-General's Dep't.	Inspectors-general.
DEPARTMENT OF THE PLATTE—Cont'd.									
Camp Brown, Wyo.	138 miles from Bryan, on U. P. R. R.	Maj. E. M. Baker, 2d Cav.	3	2d & 3d Cav. & 13th Inf.	..	..	..	..	..
Camp Douglas, Utah	3 miles east of Salt Lake City.	Col. J. E. Smith, 14th Inf.	6	14th Inf.	..	..	..	..	..
Fort Cameron, Utah	At Beaver	Lt. Col. G. A. Woodward, 14th Inf.	4	9th and 14th Inf.	..	..	..	..	..
Fort Laramie, Wyo.	89 miles north of Cheyenne.	Lt. Col. L. P. Bradley, 9th Inf.	11	2d Cav. & 4th & 9th Inf.	..	..	..	..	..
Camp Robinson, Nebr.	At Red Cloud agency	Captain Wm. H. Jordan, 9th Inf.	5	3d Cav. & 9th & 13th Inf.	..	..	..	..	..
Camp Sheridan, Nebr.	At Spotted Tail's agency	Maj. E. F. Townsend, 9th Inf.	5	3d Cav. and 9th Inf.	..	..	..	..	..
Fort Fetterman, Wyo.	170 miles from Cheyenne, on U. P. R. R.	Lt. Col. J. S. Mason, 4th Inf.	5	3d Cav. and 4th Inf.	..	..	..	..	..
Camp at Cheyenne, Wyo.	At Cheyenne	1st Lieut. L. R. Stillé, 23d Inf.	1	23d Inf.	..	..	..	..	..
Total			69		1	..	3	1	..
DEPARTMENT OF TEXAS.									
Headquarters	San Antonio, Tex.	Brig. Gen. C. C. Augur	..	Department staff.	1	..	3	1	..
Austin, Tex		Capt. E. E. Sellers, 10th Inf.	1	10th Inf.	..	..	..	..	..
Fort Bliss, Tex	Near Franklin	Capt. F. M. Coxe, 25th Inf.	1	25th Inf.	..	..	..	..	..
Fort Brown, Tex	At Brownsville	Capt. H. C. Corbin, 24th Inf.	5	24th Inf.	..	..	..	..	..
Fort Clark, Tex	126 miles west of San Antonio.	Col. R. S. Mackenzie, 4th Cav.	11	4th Cav. and 10th Inf.	..	..	..	..	..
Fort Concho, Tex	At junction of Main and North Conchos.	Maj. Henry Douglass, 11th Inf.	8	10th Cav., 10th and 11th Inf.	..	..	..	..	..
Fort Davis, Tex	466 miles northwest of San Antonio.	Col. G. L. Andrews, 25th Inf.	4	9th Cav. and 25th Inf.	..	..	..	..	..
Fort Duncan, Tex	At Eagle Pass	Capt. J. W. French, 25th Inf.	4	4th Cav., 24th and 25th Inf.	..	..	..	..	..
Fort Griffin, Tex	At Maxwell's Ranch	Lt. Col. G. P. Buell, 11th Inf.	6	10th Cav. and 11th Inf.	..	..	..	..	..
Fort McIntosh, Tex	At Loredo	Capt. C. C. Hood, 24th Inf.	1	24th Inf.	..	..	..	..	..
Fort McKavett, Tex	On San Saba River, 2 miles from its source.	Col. H. B. Clitz, 10th Inf.	6	4th Cav. and 10th Inf.	..	..	..	..	..
Fort Quitman, Tex	On the Rio Grande	Capt. Charles Bentzoni, 25th Inf.	1	25th Inf.	..	..	..	..	..
Fort Richardson, Tex.	At Jacksborough	Col. W. H. Wood, 11th Inf.	7	10th Cav. and 11th Inf.	..	..	..	..	..
Fort Stockton, Tex.	At Comanche Springs	Capt. E. G. Bush, 10th Inf.	4	9th Cav., 10th and 25th Inf.	..	..	..	..	..
Fort Sill, Ind. T.	At junction of Medicine Bluff and Cache Creeks.	Lt. Col. J. W. Davidson, 10th Cav.	9	10th Cav., 11th and 25th Inf.	..	..	..	..	..
Ringgold Barracks, Tex.	At Rio Grande City	Col. Edward Hatch, 9th Cav.	8	9th Cav. and 24th Inf.	..	..	..	..	..
Total			76		1	..	3	1	..
Grand total Military Division of the Missouri			266		5	1	14	5	1

ADJUTANT-GENERAL'S OFFICE,
Washington, D. C., October 9, 1874.

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Military Division of the Missouri, &c.—Continued.

PRESENT.																					ABSENT.						PRESENT AND ABSENT.		
Bureau of Military Justice.	Quartermaster's Department.	Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Ordnance Department.	Post-chaplains.	Military storekeepers.	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and reg'tal staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	5	164	7	171	..	..	1	1	2	2	4	9	166	175
..	1	..	1	..	..	..	..	..	1	..	1	4	..	..	..	9	251	17	268	1	..	2	1	4	4	8	21	255	276
..	..	..	1	..	..	..	..	..	..	1	..	4	..	..	..	5	172	11	183	..	..	..	3	4	3	7	14	176	190
..	..	..	1	..	..	..	..	..	..	1	..	10	..	1	1	18	631	32	663	..	1	1	2	17	4	21	36	648	684
..	..	..	1	..	..	..	..	..	..	..	..	5	..	..	..	9	230	15	245	..	..	..	1	21	1	22	16	251	267
..	..	..	..	..	..	..	..	..	..	..	1	3	..	..	..	8	269	12	281	..	..	2	2	6	4	10	16	275	291
..	..	..	..	..	..	..	..	..	..	..	1	4	..	..	..	7	255	12	267	..	..	1	2	4	3	7	15	259	274
..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	2	52	2	54	..	..	..	..	....	....	....	2	52	54
1	5	2	13	4	1	..	1	..	4	5	7	57	..	6	6	108	3,750	222	3,972	2	3	11	23	90	39	129	261	3,840	4,101
..	3	..	1	5	1	1	..	..	..	..	..	1	..	..	..	1	11	15	26	..	..	..	..	....	....	....	15	11	26
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	1	61	3	64	..	..	..	1	....	1	1	4	61	65
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	50	2	52	..	..	..	..	....	....	....	2	50	52
..	..	..	1	..	..	..	..	..	..	..	..	3	1	..	1	9	280	15	295	..	1	2	1	3	4	7	19	283	302
..	..	..	1	..	..	..	..	..	1	1	1	10	..	1	1	15	674	31	705	..	1	1	4	13	6	19	37	687	724
..	1	..	1	..	..	..	1	..	..	..	2	6	..	..	..	14	439	25	464	..	1	3	1	7	5	12	30	446	476
..	..	..	1	..	..	..	..	..	1	..	..	3	..	1	1	6	216	13	229	..	2	1	1	....	4	4	17	216	233
..	..	..	1	..	..	..	..	..	..	..	..	3	..	1	..	4	221	9	230	1	2	1	2	1	6	7	15	222	237
..	..	..	1	..	..	..	..	..	..	1	..	5	..	..	..	10	394	17	411	..	..	1	..	3	1	4	18	397	415
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	47	2	49	..	..	..	1	....	1	1	3	47	50
..	..	..	1	..	..	..	..	..	1	..	2	4	..	1	1	9	358	19	377	..	..	2	3	6	5	11	24	364	388
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	52	2	54	..	..	..	..	1	..	1	2	53	55
..	..	..	1	..	..	..	..	..	1	..	1	5	..	1	1	11	445	21	466	..	..	2	2	4	4	8	25	449	474
..	..	..	1	..	..	..	..	..	..	..	..	3	..	..	..	4	196	8	204	..	..	..	3	1	3	4	11	197	208
..	1	..	1	..	..	..	1	..	..	1	1	9	..	1	1	12	609	28	637	..	2	..	4	2	6	8	34	611	645
..	..	..	1	..	..	..	..	..	1	..	1	7	1	1	1	9	532	22	554	..	1	1	6	4	8	12	30	536	566
..	5	..	13	5	1	1	2	..	5	3	8	63	2	7	7	108	4,585	232	4,817	1	10	14	29	45	54	99	286	4,630	4,916
3	23	9	50	20	5	1	11	2	17	18	29	214	3	24	23	404	15,194	868	16,062	5	17	50	91	278	163	441	1031	15,472	16,503

E. D. TOWNSEND,
Adjutant-General.

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D.—*Position and distribution of troops in the Military Division of the Atlantic, commanded returns on file in the Adjutant-*

POSTS.	SITUATIONS.	COMMANDING OFFICERS.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Military secretary.	Aides-de-camp.	Adjutant-General's Dep't.	Inspectors-general.
				Divis'n staff.	1	..	3	1	1
Fort Wayne, Mich.	Three miles below Detroit, Mich.	Col. D. S. Stanley, 22d Inf.	...	22d Inf	..	..	..	..	..
Fort Gratiot, Mich	On the Saint Clair River, near outlet of Lake Huron, Mich.	.....	...	....do	..	..	..	..	..
Fort Brady, Mich..	At Sault Ste. Marie, Mich.	Maj. A. L. Hough, 22d Inf.	2	....do	..	..	..	..	..
F't Mackinac, Mich.	On Michilimackinac Island, Mich.	Capt. C. J. Dickey, 22d Inf.	1	....do	..	..	..	..	..
Fort Porter, N. Y ..	At Buffalo, N. Y.....	1st Lieut. J. O'Hara, 3d Art.	...	3d Art. and 22d Inf.	..	..	..	..	..
Fort Niagara, N. Y	At Youngstown, N. Y...	Maj. G. A. De Russy, 3d Art.	1	3d Art.....	..	..	..	..	..
Fort Ontario, N. Y .	At Oswego, N. Y	Capt. R. N. Scott, 3d Art	1	....do	..	..	..	..	..
Fort Hamilton, N. Y.	In New York Harbor, N. Y.	Col. G. W. Getty, 3d Art	4	....do	..	..	..	..	..
Fort Wadsworth, N. Y.	.....do	Maj. H. G. Gibson, 3d Art.	1	....do	..	..	..	..	..
Fort Wood, N. Y...	.....do	Capt. Erskine Gittings, 3d Art.	1	....do	..	..	..	..	..
David's Island, N. Y.	.....do	Maj. R. V. W. Howard, 3d Art.	2	....do	..	..	..	..	..
Madison Barracks, N. Y.	Sackett's Harbor, N. Y .	Lieut.-Col. R. V. Ayres, 3d Art.	2	3d and 5th Art.	..	..	..	..	..
Plattsburgh Barracks, N. Y.	At Plattsburgh, N. Y ...	Capt. Richard Arnold, 5th Art.	1	5th Art.....	..	..	..	..	..
Fort Preble, Me....	On Spring Point, Cape Elizabeth, Me.	Maj. Truman Seymour, 5th Art.	1	....do	..	..	..	..	..
Fort Independence, Mass.	In Boston Harbor, Mass.	Maj. Wm. Hays, 5th Art	1	....do	..	..	..	..	..
Fort Warren, Mass.	.....do	Maj. G. P. Andrews, 5th Art.	1	....do	..	..	..	..	..
Fort Adams, R. I ..	In Newport Harbor, R. I.	Col. H. J. Hunt, 5th Art	4	....do	..	..	..	..	..
F't Trumbull, Conn	At New London, Conn ..	Lt. Col. F. T. Dent, 5th Art.	2	....do	..	..	..	..	..
Fort McHenry, Md.	At Baltimore, Md.....	Lt. Col. W. H. French, 2d Art.	3	2d Art.....	..	..	..	..	..
Fort Foote, Md	On Potomac River, 8 miles below Washington, D. C.	Capt. J. C. Breckenridge, 2d Art.	1	....do	..	..	..	..	..
Fort Monroe, Va...	At Old Point Comfort, Va.	Col. W. F. Barry, 2d Art	5	1st, 2d, 3d, 4th, & 5th Art.	..	..	..	..	..
Total Military Division of the Atlantic.....			34		1	..	3	1	1

ADJUTANT-GENERAL'S OFFICE,
Washington, D. C., October 9, 1874.

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by Major-General W. S. Hancock, headquarters New York City, N. Y., taken from the latest General's Office, 1874.

PRESENT.																					ABSENT.						PRESENT AND ABSENT.		
Bureau of Military Justice.	Quartermaster's Department.	Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Ordnance Department.	Post-chaplains.	Military store-keepers.*	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and reg'tal staff officers.	Chaplains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
1	5	4	2	5	..	..	..	1	..	..	..	..	..	..	..	..	10	21	31	..	..	..	..	..	..	..	21	10	31
..	..	..	1	..	..	..	1	..	1	..	..	..	..	1	1	..	29	5	34	..	..	..	..	..	..	..	5	29	34
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	4	..	..	..	..	..	..	..	1	3	4
..	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	4	88	7	95	..	..	..	..	4	..	4	7	92	99
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	50	4	54	..	..	..	..	2	..	2	4	52	56
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	15	2	17	..	..	..	1	..	1	1	3	15	18
..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	1	32	3	35	..	..	1	..	..	1	1	4	32	36
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	48	4	52	..	..	..	1	1	1	2	5	49	54
..	..	..	1	..	..	..	..	..	1	..	..	4	..	1	1	11	247	19	266	..	..	..	3	6	3	9	22	253	275
..	..	..	1	..	..	..	..	..	..	..	1	1	..	..	*	3	45	6	51	..	..	..	..	3	..	3	6	48	54
..	..	..	1	..	..	..	..	1	..	..	..	1	..	..	..	3	48	6	54	..	..	..	..	1	..	1	6	49	55
..	..	..	1	..	..	..	..	..	..	..	1	2	..	..	..	4	81	8	89	..	..	..	2	3	2	5	10	84	94
..	..	..	1	..	..	..	..	..	..	1	..	2	..	..	..	2	68	6	74	..	..	..	3	5	3	8	9	73	82
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	3	48	5	53	..	..	..	..	..	..	..	5	48	53
..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	2	38	4	42	..	..	..	1	2	1	3	5	40	45
..	..	..	1	..	..	..	..	..	..	..	1	1	..	..	..	3	53	6	59	..	..	..	..	1	..	1	6	54	60
..	..	..	1	..	..	..	1	..	..	..	1	1	..	..	..	3	46	7	53	..	..	..	..	1	..	1	7	47	54
..	1	..	1	..	..	..	..	..	1	..	..	3	..	1	1	8	203	16	219	..	..	2	3	6	5	11	21	209	230
..	..	..	1	..	..	..	..	..	..	1	..	2	..	..	..	4	78	8	82	..	..	..	2	..	2	2	10	74	84
..	..	..	2	..	..	..	..	..	..	1	..	3	..	1	1	8	216	16	232	..	..	..	2	14	2	16	18	230	248
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	3	52	4	56	..	1	..	..	2	1	3	5	54	59
..	1	..	2	..	..	..	1	..	1	1	1	5	..	..	..	22	333	34	367	..	..	..	..	24	..	24	34	357	391
1	7	4	23	5	..	..	3	2	4	4	7	31	..	4	4	90	1,827	192	2,019	..	1	3	18	75	22	97	214	1,902	2,116

E. D. TOWNSEND,
Adjutant-General.

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E.—*Position and distribution of troops in the Military Division of the Pacific, commanded by on file in the Adjutant*

POSTS.	SITUATIONS.	COMMANDING OFFICERS.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Military secretary.	Aids-de-camp.	Adjutant-General's Dep't.	Inspectors-general.
DEPARTMENT OF CALIFORNIA.				Division staff	1	..	3	1	1
Headquarters	San Francisco, Cal	Maj. Gen. J. M. Schofield	...	Department staff.	..	..	..	..	..
Presidio, Cal		Col. Horace Brooks, 4th Art.	5	4th Art	..	..	..	..	..
Point San José, Cal	In San Francisco harbor	Capt. John Mendenhall, 4th Art.	1	....do	..	..	..	..	..
Alcatraz Island, Cal	.....do	Maj. C. H. Morgan, 4th Art.	1	....do	..	..	..	..	..
Angel Island, Cal	.....do	Lt. Col. A. D. Nelson, 12th Inf.	1	12th Inf	..	..	..	..	..
Camp Independence, Cal.	In Owens River Valley	Capt. A. B. MacGowan, 12th Inf.	1	....do	..	..	..	..	..
Benicia Barracks, Cal.	At Benicia	Col. A. C. Gillem, 1st Cav.	2	1st Cav	..	..	..	..	..
Camp Bidwell, Cal	At north end of Surprise Valley.	Capt. R. F. Bernard, 1st Cav.	2	1st Cav. and 12th Inf.	..	..	..	..	..
Camp McDermitt, Nev.	80 miles north of Winnemucca, on C. P. R. R.	Capt. Henry Wagner, 1st Cav.	1	1st Cav	..	..	..	..	..
Camp Halleck, Nev	12 miles south of Halleck Station.	Capt. C. C. C. Carr, 1st Cav.	2	1st Cav. and 12th Inf.	..	..	..	..	..
Camp Gaston, Cal	Near junction of Trinity and Klamath Rivers.	Maj. H. R. Mizner, 12th Inf.	2	12th Inf	..	..	..	..	..
Camp Wright, Cal	In Round Valley	Capt. E. C. Woodruff, 12th Inf.	1	....do	..	..	..	..	..
Fort Hall, Idaho	140 miles north of Corrine, Utah.	Capt. J. L. Viven, 12th Inf.	1	....do	..	..	..	..	..
Total			20		..	..	..	..	..
DEPARTMENT OF THE COLUMBIA.									
Headquarters	Portland, Oreg	Brig. Gen. O. O. Howard.	...	Department staff.	1	..	2	1	..
Fort Boise, Idaho	Near Boise City	Capt. G. M. Downey, 21st Inf.	1	21st Inf	..	..	..	..	..
Cape Disappointment, Wash.	At the mouth of the Columbia River.	Capt. F. G. Smith, 4th Art.	1	4th Art	..	..	..	..	..
Fort Colville, Wash	Near boundary-line between the United States and British Columbia.	Capt. Evan Miles, 21st Inf.	1	21st Inf	..	..	..	..	..
Camp Harney, Oreg	60 miles south of Cañon City.	Maj. Elmer Otis, 1st Cav.	3	1st Cav. and 21st Inf.	..	..	..	..	..
Fort Klamath, Oreg	Near Lake Klamath	Capt. James Jackson, 1st Cav.	2	....do	..	..	..	..	..
Fort Lapwai, Idaho	12 miles from Lewiston	Capt. H. M. Smith, 21st Inf.	2	....do	..	..	..	..	..
Sitka, Alaska		Capt. J. B. Campbell, 4th Art.	2	4th Art	..	..	..	..	..
Fort Stevens, Oreg	Near mouth of Columbia River.	Capt. M. P. Miller, 4th Art.	1	....do	..	..	..	..	..
Fort Townsend, Wash.	Near Port Townsend	Capt. G. H. Burton, 21st Inf.	1	21st Inf	..	..	..	..	..
Fort Vancouver, Wash.	18 miles north of Portland, Oreg.	Col. Alfred Sully, 21st Inf.	1	....do	..	..	..	..	..
Fort Walla-Walla, Wash.	In Walla-Walla Valley	Lt. Col. Frank Wheaton, 21st Inf.	5	1st Cav. and 21st Inf.	..	..	..	..	..
Total			20		1	..	2	1	..

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Major General J. M. Schofield, headquarters San Francisco, Cal., taken from the latest returns General's Office, 1874.

PRESENT.																					ABSENT.							PRESENT AND ABSENT.		
Bureau of Military Justice.	Quartermaster's Department.	Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Ordnance Department.	Post chaplains.	Military store-keepers.	Colonels.	Lieutenant colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and reg'tal staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
..	2	1	1	..	1	..	..	1	..	..	..	..	..	..	..	..	10	9	19	..	..	..	..	..	..	..	9	10	19
1	1	1	1	3	..	..	..	..	..	..	..	..	..	..	..	..	10	7	17	1	..	..	..	..	1	1	8	10	18
..	..	..	1	..	..	..	1	..	1	..	1	5	..	1	1	12	240	23	263	..	1	..	3	4	4	8	27	244	271
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	3	60	5	65	..	..	..	..	..	..	..	5	60	65
..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	3	35	5	40	..	..	..	..	..	..	..	5	35	40
..	..	..	..	..	..	..	1	..	..	1	..	..	..	1	1	1	78	5	83	..	1	1	1	2	3	5	8	80	88
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	40	4	44	..	..	..	..	..	..	..	4	40	44
..	..	..	1	..	..	..	1	..	1	..	..	1	..	1	1	3	150	9	159	..	1	1	1	3	3	6	12	153	165
..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	3	91	5	96	..	..	..	1	5	1	6	6	96	102
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	57	3	60	..	..	..	..	2	..	2	3	59	62
..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	4	91	6	97	..	..	1	..	6	1	7	7	97	104
..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	4	82	6	88	..	..	1	..	..	1	1	7	82	89
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	41	2	43	..	..	..	1	1	1	2	3	42	45
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	49	2	51	..	..	..	1	..	1	1	3	49	52
1	1	1	5	3	..	..	4	..	2	1	3	16	..	3	3	39	1,024	82	1,106	1	3	4	8	23	16	39	98	1,047	1,145
..	1	1	1	3	..	..	..	..	..	..	..	..	..	..	..	..	10	8	18	..	..	..	..	..	..	..	8	10	18
..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	1	40	3	43	..	..	..	1	1	1	2	4	41	45
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	45	3	48	..	..	..	1	1	1	2	4	46	50
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	46	2	48	..	..	..	1	..	1	1	3	46	49
..	..	..	1	..	..	..	..	..	..	..	1	2	..	..	..	4	147	8	155	..	..	1	2	4	3	7	11	151	162
..	..	..	1	..	..	..	1	..	..	..	..	2	..	..	..	4	98	8	106	..	..	..	..	3	..	3	8	101	109
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	4	111	5	116	..	..	1	..	3	1	4	6	114	120
..	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	3	95	6	101	..	..	..	3	..	3	3	9	95	104
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	53	4	57	..	..	..	1	..	1	1	5	53	58
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	46	2	48	..	..	..	1	..	1	1	3	46	49
..	1	..	1	..	..	..	1	..	1	..	1	..	..	1	1	2	88	9	97	..	..	1	..	..	1	1	10	88	98
..	..	..	1	..	..	..	..	..	..	1	1	5	..	..	..	10	229	18	247	..	..	..	..	7	..	7	18	236	254
..	2	1	7	3	..	..	3	..	1	1	3	17	..	1	1	34	1,008	76	1,084	..	..	3	10	19	13	32	89	1,027	1,116

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E.—*Position and distribution of troops in the*

POSTS.	SITUATIONS.	COMMANDING OFFICERS.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Military secretary.	Aids-de-camp.	Adjutant-General's Dep't.	Inspectors-general.
DEPARTMENT OF ARIZONA.									
Headquarters	Prescott, Ariz	Brig. Gen. George Crook	...	Department staff.	1	..	3	..	..
Camp Apache, Ariz	In White Mountain country.	Capt. R. H. Montgomery, 5th Cav.	3	5th Cav	..	..	..	..	..
Camp at La Paz, Ariz.	.....	Capt. Thomas Byrne, 12th Inf.	1	12th Inf....	..	..	..	..	..
Camp Bowie, Ariz .	At Apache Pass	Capt. S. S. Sumner, 5th Cav.	1	5th Cav.....	..	..	..	..	..
Camp Grant, Ariz..	At the foot of Mount Graham.	Maj. G. A. Gordon, 5th Cav.	3	....do	..	..	..	..	..
Camp Lowell, Ariz.	Near Tucson.....	Maj. W. B. Royal, 5th Cav.	1	....do	..	..	..	..	..
Camp McDowell, Ariz.	52 miles north of Maricopa Wells.	2d Lieut. C. D. Parkhurst, 5th Cav.	1	....do	..	..	..	..	..
Camp Mojave, Ariz	Near the head of Mojave Valley.	Capt. E. F. Thompson, 12th Inf.	1	12th Inf.....	..	..	..	..	..
Camp Verde, Ariz .	38 miles from Prescott ..	Capt. J. W. Mason, 5th Cav.	2	5th Cav	..	..	..	..	..
Fort Whipple, Ariz	Near Prescott	1st Lieut. E. D. Thomas, 5th Cav.	1	....do	..	..	..	..	..
Fort Yuma, Cal....	At junction of Gila and Colorado Rivers.	Capt. H. C. Egbert, 12th Inf.	1	12th Inf.....	..	..	..	..	..
	En route to posts in the department.	Col. A. V. Kautz, 8th Inf.	10	8th Inf.....	..	..	..	..	..
Total.....	.....	.....	25	.....	1	..	3	..	..
Grand total Military Division of the Pacific			65	.....	3	..	8	2	1

ADJUTANT-GENERAL'S OFFICE,
Washington, D. C., October 9, 1874.

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Military Division of the Pacific, &c.—Continued.

PRESENT.																								ABSENT.						PRESENT AND ABSENT.		
Bureau of Military Justice.	Quartermaster's Department.	Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Ordnance Department.	Post-chaplains.	Military store-keepers.	Colonels.	Lieutenant colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and reg'tal staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
..	3	1	1	3	..	..	..	..	..	..	1	....	..	..	..	....	9	10	19	..	..	..	....	....	....	....	10	9	19
..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	5	245	7	252	..	..	1	1	3	2	5	9	248	257
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	43	2	45	..	..	..	....	....	....	....	2	43	45
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	71	2	73	..	..	..	1	....	1	1	3	71	74
..	..	..	1	..	..	..	..	..	..	..	1	2	..	..	..	5	204	9	213	..	..	1	1	1	2	3	11	205	216
..	..	..	1	..	..	..	..	..	..	..	1	1	..	1	1	2	100	7	107	..	2	..	....	1	2	3	9	101	110
..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	1	71	1	72	..	..	1	1	2	2	4	3	73	76
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	50	2	52	..	..	..	....	..	..	....	2	50	52
..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	2	124	4	128	..	..	..	2	3	2	5	6	127	133
..	..	..	1	..	..	..	1	..	..	..	..	....	..	..	..	2	74	4	78	..	..	1	....	....	1	1	5	74	79
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	1	43	3	46	..	..	..	1	....	1	1	4	43	47
..	..	..	..	..	..	..	..	..	1	1	1	10	..	1	1	17	500	32	532	..	..	..	3	....	3	3	35	500	535
..	3	1	5	3	..	..	1	..	1	1	4	21	..	2	2	38	1,534	83	1,617	..	2	4	10	10	16	26	99	1,544	1,643
1	8	4	18	9	1	..	8	1	4	3	10	54	..	6	6	111	3,576	250	3,826	1	5	11	28	52	45	97	295	3,628	3,923

E. D. TOWNSEND,
Adjutant-General.

6 W

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F.—*Position and distribution of troops in the Military Division of the South, commanded by* on file in the

POSTS.	SITUATIONS.	COMMANDING OFFICERS.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Military secretary.	Aids-de-camp.	Adjutant-General's Dep't.	Inspectors-general.
DEPARTMENT OF THE SOUTH.				Division staff	1	..	2	1	..
Headquarters	Louisville, Ky	Maj. Gen. I. McDowell,	...	Department staff.	..	..	..	..	..
Fort Macon, N. C.		Capt. J. I. Rodgers, 2d Art.	1	2d Art.	..	..	..	..	..
Marion, N. C.		Capt. E. B. Williston, 2d Art.	1	....do	..	..	..	..	..
Raleigh, N. C.		Maj. H. A. Allen, 2d Art.	1	....do	..	..	..	..	..
Charleston, S. C.		Col. Israel Vogdes, 1st Art.	3	1st Art	..	..	..	..	..
Barnwell, S. C		1st Lieut. W. P. Vose, 2d Art.	1	2d Art.	..	..	..	..	..
Marion, S. C		1st Lieut. J. McGilvray, 2d Art.	1	....do	..	..	..	..	..
Spartanburgh, S. C		Capt. C. A. Woodruff, 2d Art.	1	....do	..	..	..	..	..
Unionville, S. C.		Capt. A. C. M. Pennington, 2d Art.	1	....do	..	..	..	..	..
Columbia, S. C.		Capt. M. L. Ogden, 18th Inf.	2	18th Inf.	..	..	..	..	..
Edgefield, S. C.		1st Lieut. M. Leahy, 18th Inf.	1	....do	..	..	..	..	..
Yorkville, S. C.		Capt. J. K. Hyer, 18th Inf.	1	....do	..	..	..	..	..
Abbeville, S. C.		Capt. W. H. McLaughlin, 18th Inf.	1	....do	..	..	..	..	..
Newberry, S. C		Capt. James Stewart, 18th Inf.	1	....do	..	..	..	..	..
Savannah, Ga		Capt. H. W. Closson, 1st Art.	1	1st Art	..	..	..	..	..
Atlanta, Ga		Maj. W. H. Brown, 18th Inf.	1	18th Inf.	..	..	..	..	..
Mount Vernon Barracks, Ala.		Capt. A. W. Kroutinger, 2d Inf.	1	2d Inf.	..	..	..	..	..
Huntsville, Ala		Capt. W. F. Drum, 2d Inf.	1	....do	..	..	..	..	..
Demopolis, Ala		Capt. Wm. Falck, 2d Inf.	1	....do	..	..	..	..	..
Montevallo, Ala		Capt. M. A. Cochran, 2d Inf.	1	....do	..	..	..	..	..
Livingston, Ala		Capt. Wm. Mills, 2d Inf	1	....do	..	..	..	..	..
Eufaula, Ala		Capt. A. S. Daggett, 2d Inf.	1	....do	..	..	..	..	..
Carrollton, Ala		1st Lieut. A. Haines, jr., 2d Inf.	1	....do	..	..	..	..	..
Butler, Ala		1st Lieut. A. R. Egbert, 2d Inf.	1	....do	..	..	..	..	..
Lebanon, Ky.		Capt. C. E. Morse, 16th Inf.	1	16th Inf.	..	..	..	..	..
Frankfort, Ky		Capt. C. R. Layton, 16th Inf.	1	....do	..	..	..	..	..
Lancaster, Ky		Capt. J. S. Fletcher, jr., 16th Inf.	1	....do	..	..	..	..	..
Chattanooga, Tenn		Capt. H. C. Cook, 2d Inf.	1	2d Inf.	..	..	..	..	..
Humboldt, Tenn		Capt. D. M. Vance, 16th Inf.	1	16th Inf.	..	..	..	..	..
Nashville, Tenn		Capt. W. G. Wedemeyer, 16th Inf.	1	....do	..	..	..	..	..
Total			32		..	..	..	..	..

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Major-General Irvin McDowell, headquarters Louisville, Ky., taken from the latest returns Adjutant-General's Office.

PRESENT.																				ABSENT.							PRESENT AND ABSENT.		
Bureau of Military Justice.	Quartermaster's Department.	Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Ordnance Department.	Post-chaplains.	Military storekeepers.	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and reg'tal staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
..	1	1	..	..	..	..	..	..	..	..	..	....	..	..	..	....	7	4	11	..	..	..	....	....	....	....	4	7	11
..	..	1	1	3	..	..	..	..	..	..	..	1	..	..	..	....	7	6	13	..	..	..	....	....	....	....	6	7	13
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	....	40	2	42	..	..	..	3	....	3	3	5	40	45
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	46	2	48	..	..	..	1	....	1	1	3	46	49
..	1	..	1	..	..	..	..	..	..	..	1	1	..	..	..	2	40	6	46	..	..	1	1	....	2	2	8	40	48
..	1	..	1	..	..	..	..	..	..	1	..	2	..	1	1	7	137	14	151	..	..	1	4	4	5	9	19	141	160
..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	2	40	2	42	..	..	1	1	....	2	2	4	40	44
..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	2	44	2	46	..	..	1	1	....	2	2	4	44	48
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	40	2	42	..	..	..	2	....	2	2	4	40	44
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	44	4	48	..	..	..	1	....	1	1	5	44	49
..	..	..	..	..	..	..	..	..	1	..	..	2	..	1	1	4	107	9	116	..	2	..	....	4	2	6	11	111	122
..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	2	40	2	42	..	..	1	....	1	1	2	3	41	44
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	35	3	38	..	..	..	....	1	...	1	3	36	39
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	46	3	49	..	..	..	....	....	....	....	3	46	49
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	42	4	46	..	..	..	....	....	....	....	4	42	46
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	51	4	55	..	..	..	1	....	1	1	5	51	56
..	..	..	1	..	..	..	..	1	..	..	1	1	..	..	..	1	36	5	41	..	..	..	1	...	1	1	6	36	42
..	..	..	1	..	..	..	..	..	..	..	..	1	..	1	1	1	81	5	86	..	..	..	1	2	1	3	6	83	89
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	51	4	55	..	..	..	....	2	...	2	4	53	57
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	44	3	47	..	..	..	....	....	....	....	3	44	47
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	49	2	51	..	..	..	1	2	1	3	3	51	54
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	38	3	41	..	..	..	....	3	...	3	3	41	44
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	36	3	39	..	..	..	....	4	...	4	3	40	43
..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	2	45	2	47	..	..	1	...	1	1	2	3	46	49
..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	2	43	2	45	..	..	1	...	1	1	2	3	44	47
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	51	2	53	..	..	..	1	....	1	1	3	51	54
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	56	2	58	..	..	..	1	....	1	1	3	56	59
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	42	3	45	..	..	..	....	1	...	1	3	43	46
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	51	4	55	..	..	..	....	....	....	....	4	51	55
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	47	3	50	..	..	..	....	6	...	6	3	53	56
..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1	2	75	5	80	..	1	..	....	5	1	6	6	80	86
..	2	1	12	3	..	..	1	1	..	1	2	27	..	3	4	56	1,504	113	1,617	..	3	7	20	37	30	67	143	1,541	1,684

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F.—*Position and distribution of troops in the*

POSTS.	SITUATIONS.	COMMANDING OFFICERS.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Military secretary.	Aids-de-camp.	Adjutant-General's Dep't.	Inspectors-general.
DEPARTMENT OF THE GULF.									
Headquarters	New Orleans, La	Col. W. H. Emory, 5th Cav.	...	Department staff.	..	..	3	1	..
New Orleans		Col. G. Pennypacker, 16th Inf.	19	1st Art., and 2d, 3d, 18th, & 22d Inf.	..	..	..	..	..
Baton Rouge, La		Capt. Clayton Hale, 16th Inf.	1	16th Inf	..	..	..	..	..
Colfax, La		Capt. A. W. Allyn, 16th Inf.	1	....do	..	..	..	..	..
Monroe, La		Capt. G. E. Head, 3d Inf.	1	3d Inf.	..	..	..	..	..
Shreveport, La		Capt. D. Parker, 3d Inf	1	....do	..	..	..	..	..
Coushatta, La		1st Lt. Wm. Mitchell, 3d Inf.	1	....do	..	..	..	..	..
Pineville, La		1st Lt. E. A. Belger, 3d Inf.	1	....do	..	..	..	..	..
Saint Martinsville, La.		Capt. J. H. Gageby, 3d Inf.	1	....do	..	..	..	..	..
Fort Barrancas, Fla		Maj. J. M. Brannan, 1st Art.	1	1st Art	..	..	..	..	..
Saint Augustine, Fla.		Maj. J. Hamilton, 1st Art.	1	....do	..	..	..	..	..
Key West, Fla		1st Lt. R. G. Shaw, 1st Art.	2	....do	..	..	..	..	..
Little Rock, Ark		Maj. S. A. Wainwright, 16th Inf.	2	16th Inf	..	..	..	..	..
Jackson, Miss		Capt. H. A. Theaker, 16th Inf.	1	....do	..	..	..	..	..
Total			33		..	..	3	1	..
Grand total Military Division of the South			65		1	..	5	2	..

ADJUTANT-GENERAL'S OFFICE,
Washington, D. C., October 9, 1874.

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Military Division of the South, &c.—Continued.

PRESENT.																					ABSENT.						PRESENT AND ABSENT.		
Bureau of Military Justice.	Quartermaster's Department.	Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Ordnance Department.	Post-chaplains.	Military store-keepers.	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and reg'tal staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
..	1	1	1	2	..	..	..	..	1	..	..	....	..	..	..	....	11	7	18	..	..	..	....	....	....	....	7	11	18
..	..	..	1	..	..	..	..	..	2	1	1	14	..	2	..	24	726	45	771	..	..	6	12	39	18	57	63	765	828
..	1	..	1	..	..	..	..	..	..	..	..	1	..	..	..	1	52	4	56	..	..	..	1	....	1	1	5	52	57
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	51	2	53	..	..	..	1	3	1	4	3	54	57
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	48	2	50	..	..	..	1	1	1	2	3	49	52
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	41	2	53	..	..	..	1	....	1	1	3	41	44
..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	1	42	1	43	..	..	1	1	....	2	2	3	42	45
..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	1	38	1	39	..	..	..	....	....	....	....	1	38	39
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	37	2	39	..	..	..	1	2	1	3	3	39	42
..	..	..	1	..	..	..	..	..	..	..	1	....	..	..	..	3	20	5	25	..	..	1	....	1	1	2	6	21	27
..	..	..	1	..	..	..	..	..	..	..	1	1	..	..	..	1	48	4	52	..	..	..	2	2	2	4	6	50	56
..	..	..	1	..	..	..	..	..	..	..	..	....	..	..	..	2	89	3	92	..	1	2	4	5	7	12	10	94	104
..	..	..	1	..	..	..	..	..	..	..	1	2	..	..	..	4	115	8	123	..	..	..	....	3	...	3	8	118	126
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	43	2	45	..	..	..	1	....	1	1	3	43	46
..	2	1	7	2	..	..	..	..	3	1	4	23	..	2	..	42	1,361	88	1,449	..	1	10	25	56	36	92	124	1,417	1,541
..	5	3	19	5	..	..	1	1	4	1	6	50	..	5	4	98	2,872	205	3,071	..	4	17	45	93	66	159	271	2,965	3,236

E. D. TOWNSEND,
Adjutant-General.

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Report of the recruiting service from October 1, 1873, to October 1, 1874.

WAR DEPARTMENT, ADJUTANT GENERAL'S OFFICE,
Washington, October 6, 1874.

Recruiting for cavalry, artillery, and infantry was conducted at the principal eastern and western cities until January 20, 1874, when orders were issued to suspend operations, the Army being at its authorized strength, (30,000 men.) These orders were subsequently modified so as to permit the enlistment of skilled artisans, musicians, &c.

The act of Congress approved June 16, 1874, having provided "that no money appropriated by this act shall be paid for recruiting the Army beyond the number of 25,000 enlisted men, including Indian scouts," (the signal service being excepted from its provisions,) orders were issued June 22, 1874, prohibiting further recruiting, except that non-commissioned officers and other meritorious soldiers may be re-enlisted at the posts where they may be serving on the expiration of their present terms of enlistment, and with a view to still further reduce the Army, authority was also given to department commanders to discharge such men as may be reported by their company commanders as habitually worthless to the service.

The number of recruiting stations was also diminished to sixteen in in the eastern and western cities and one on the Pacific coast, and the permanent and recruiting parties at depots and rendezvous reduced to the lowest strength compatible with efficiency as garrisons of the depots.

E. D. TOWNSEND,
Adjutant General.

Statement showing the number of enlistments and re-enlistments in the Regular Army from October 1, 1873 to October 1, 1874; compiled from reports forwarded to this office by superintendents of the recruiting service, &c.

Regiments, &c.	Number enlisted and re-enlisted.	Regiments, &c.	Number enlisted and re-enlisted.	Regiments, &c.	Number enlisted and re-enlisted.
General service	2,088	Eighth Cavalry	46	Eleventh Infantry	13
Mounted service	1,650	Ninth Cavalry	7	Twelfth Infantry	17
Engineer Battalion	92	Tenth Cavalry	8	Thirteenth Infantry	24
Ordnance Department	89	First Artillery	33	Fourteenth Infantry	10
Military Academy	59	Second Artillery	77	Fifteenth Infantry	15
Artillery School	.....	Third Artillery	182	Sixteenth Infantry	98
Signal Corps	164	Fourth Artillery	77	Seventeenth Infantry	10
Ordnance-sergeants	1	Fifth Artillery	81	Eighteenth Infantry	19
Hospital-stewards	7	First Infantry	136	Nineteenth Infantry	86
Commissary-sergeants	10	Second Infantry	62	Twentieth Infantry	32
Indian scouts	117	Third Infantry	60	Twenty-first Infantry	8
First Cavalry	76	Fourth Infantry	27	Twenty-second Infantry	9
Second Cavalry	149	Fifth Infantry	87	Twenty-third Infantry	8
Third Cavalry	92	Sixth Infantry	2	Twenty-fourth Infantry	2
Fourth Cavalry	60	Seventh Infantry	6	Twenty-fifth Infantry	.....
Fifth Cavalry	35	Eighth Infantry	13		
Sixth Cavalry	80	Ninth Infantry	65	Total	6,130
Seventh Cavalry	28	Tenth Infantry	13		

NOTE.—Of the recruits enlisted for general service, 82 were for colored infantry; and of those for mounted service, 220 were for colored cavalry.

E. D. TOWNSEND,
Adjutant-General.

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, October 6, 1874.

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List of applications for troops received at the Adjutant-General's Office from October, 1873, to October, 1874.

Whole number of applications received	79
Number received through, or pertaining to, the Department of the Interior	20
Number received through, or pertaining to, the Department of Justice	18
Number received through, or pertaining to, the Treasury Department	9
Number received through, or pertaining to, the Department of State	1
Number received from, or through, members of Congress	9
Number received from, or through, governors of States and Territories, or from the legislatures thereof	8
Number received from local civil authorities	3
Number received from other sources	11
	79

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, October 6, 1874.

Applications for troops from October, 1873, to October, 1874.

Office-mark.	Applicant.	For what purpose required.
4028—73 *et al.*	Interior Department	To punish Comanches who are off their reservation at Fort Sill; also, to patrol the frontier to prevent raids into Texas.
4249—73 } 4291—73 }	....do	To protect Crow agency.
4389—73	....do	To strike the Sioux who attacked the Poncas.
4379—73	....do	To arrest leaders of Indians who attacked General Custer's command on the Yellowstone expedition.
4608—73	Department of Justice	To assist United States marshal for northern district of Mississippi in making arrests.
4743—73	Interior Department	To assist United States marshal in ejecting intruders from the Diminished Indian reservations in Kansas.
4746 } 4772 } 1873	....do	To assist in removing the Winnebago Indians from Wisconsin to Nebraska.
4846—73	Civil officers of Jessamine County, Kentucky.	For the preservation of peace and order at Nicholasville, Ky.
4886—73	Interior Department	As escort to commissioners to visit Judith Basin with a view to establishing the agency for the Crow Indians.
5158—73	....do	To strike Sioux who are off their reservations.
36—74	Citizens of Nueces County, Texas	For protection against outrages by white men.
151—74	Citizens of Meagher County, Montana.	For increase of garrison of Camp Baker, to protect settlers from Indians.
264—74	Department of Justice	Two companies called for to aid in enforcement of the laws in the northern district of Mississippi.
440—74 *et al.*	Citizens of California	For protection of settlers in Goose Lake Valley; establishment of a three or four company post asked for.
479—74	Citizens of Texas	To prevent depredations by Indians. Request that 10th and 11th Infantry be mounted.
551—74	Interior Department	To aid civil officers in enforcing the laws and quelling disturbances in Lincoln County, New Mexico, as requested by the governor of that Territory.
598—74	Hon. D. C. Giddings, M. C	For protection of frontier settlements in Texas from Indian raids.
885—74	Hon. John Hancock, M. C	For protection of frontier settlements in Texas from Indian raids.
709—74	Interior Department	To protect surveyors of northern boundary of Nebraska.
442 } 653 } 74	Treasury Department	To assist supervisor at New York in breaking up illicit distilleries.
825—74	Department of Justice	To assist United States marshal for southern district of New York in enforcing the order of the United States circuit court in case of the New York and Oswego Midland Railroad.
981—74	Citizens of Valley County, Nebraska	For protection from Indians.
1056—74	Citizens of Dakota, through Hon. M. K. Armstrong.	For establishment of a military post in Western Dakota, in heart of the Sioux country.
1064—74	Citizens of Nebraska, through Department of the Platte and Senator Hitchcock.	For establishment of a military-post on north branch of Loupe River, for protection of settlements from Indians.
1138—74	Governor of Minnesota.	For protection of frontier from Indians.
1324—74	Citizens of Weld County, Colorado, through acting governor.	For protection from roving bands of Indians.

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Applications for troops from October, 1873, to October, 1874—Continued.

Office-mark.	Applicant.	For what purpose required.
1297—74	Interior Department	To assist in removal of trespassers on Ute reservation.
1325—74	Department of State, (request in 1872.)	Escort for Northern Boundary Survey for season of 1874.
1337—74	Treasury Department	To assist collector of internal revenue in first district, Tennessee, in suppressing illicit distilleries in Cocke County.
1388—74	Supervisor internal revenue	To assist revenue agent in vicinity of New York City.
1393—74	Revenue agent, New Orleans, La., (through Commissioner Internal Revenue.)	To take and hold certain property to be seized for violation of United States revenue laws.
1432—74	Citizens of Montana, through Hon. M. Maginnis.	For increase of garrison of Fort Benton, Montana Territory,
1456—74	Indian agent Malheur reservation, Oregon.	To prevent an outbreak among the Indians, arrest disaffected Indians, &c.
1620—74	Legislature of Montana, memorial to Congress, transmitted to Secretary of War by order of the U. S. Senate.	For protection to citizens of Deer Lodge and Missoula Counties against roving bands of Indians.
1625—74	Citizens of Montana, through Hon. H. D. Cooke.	For establishment of military post at confluence of Big Horn and Yellowstone Rivers and at Glendine Creek.
1643—74	State of Texas, joint resolution of legislature.	Additional regiments of cavalry for protection of frontiers.
1495—74	Governor of Mississippi to department commander.	To assist in keeping the peace at Vicksburgh.
1747—74	Interior Department	As escorts to surveyor of portion of boundaries of Colorado and New Mexico.
1897—74	Express agent, Little Rock, Ark	For protection of express-office pending difficulties growing out of rival claimants for the governorship.
1912—74	Revenue agent, Little Rock, Ark	For protection of the records and of the collector's office during difficulties as above stated.
2191—74	U. S. marshal, Louisville, Ky	To assist in serving United States civil process in Monterey, Owen County, Ky.
2239—74 2468—74 3054—74	United States deputy marshal, Dalton, Ga.	To aid in arrest of parties by warrant in Murray County, Georgia.
2252—74	Interior Department	For removal from Cheyenne and Arapahoe Indian reservations, Indian Territory, of citizen outlaws, horse-thieves, and desperadoes.
2369 1874.	United States deputy marshal, Dalton, Ga.	To aid in arrest of parties in Walker County, Georgia.
2389 1874.	Citizens of San Juan Island, Washington Territory.	Petition for retention of garrison for their protection from Indians.
2590—74	Collector internal revenue	To assist in breaking up illicit distilleries in Hall and adjoining counties, Georgia.
2768—74 3108—74 3472—74	Citizens of Southern Colorado and Northern New Mexico, also governor of New Mexico.	For protection from Indian outrages
2796—74	Hon. J. H. Mitchell	To re-enforce Camp Harney, Oregon, for protection of settlers against the Snake Indians on the Malheur River.
2312—74	Mayor of Pensacola, Fla	To assist civil authorities in enforcing the quarantine laws.
2879—74 2792—74	Interior Department	Escort to Bishop Hare, chairman of commission to investigate affairs at Red Cloud and Whetstone agencies.
2931—74	United States Indian agent	To assist in protecting the Wichita agency, Indian Territory.
2930—74	United States Indian agency	To assist in protecting the Cheyenne and Arapahoe agency, Indian Territory.
3006—74	United States marshal	To assist in making arrests in White County, Georgia.
3007—74	United States marshal	To assist in making arrests in Walker County, Georgia.
3071—74	Emigrants	For protection on road from North Platte to Colorado.
3160—74	Hon. Alexander Ramsey, United States Senator.	For protection of settlers at Walhalla and Saint Joe, Dak., against Indians.
3213—74	Governor of Louisiana	For distribution of United States troops designed for that State, so as to afford protection and preserve the peace.
3223—74	United States Indian Agent E. H. Danforth.	For establishment of a military post in Bear River Valley, Colo., to keep peace between Indians and settlers.
3221—74	C. L. DuBois, United States surveyor, through Interior Department.	Escort for his protection in the survey of the Kiowa and Comanche reservation.
3574—74	Collector of internal revenue, eighth district Kentucky, and citizens of Garrard County.	Requests that the company of United States troops at Lancaster be retained to preserve peace and assist in enforcement of the revenue laws.
3575—74	Deputy United States marshal Athens, Ga.	To assist in making arrests in Madison, Hart, and Ebbett Counties, Ga.
3573—74	United States marshal western district of Arkansas, through Department of Justice.	Requests two companies of cavalry to assist in arresting persons charged with violation of United States laws in his district, which embraces the Indian country.

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Applications for troops from October, 1873, to October, 1874—Continued.

Office-mark.	Applicant.	For what purpose required.
3579 3580 } 74.... 3581	Department of Justice	To assist United States marshals and attorneys in arresting and bringing to punishment the perpetrators of outrages in certain Southern States, particularly Louisiana, Alabama, and South Carolina.
3595—74....	United States marshal southern district of Alabama, through Department of Justice.	To aid in executing process of the United States courts.
3501—74....	Interior Department	To compel a party of Chippewas of Red Lake to return to their reservation.
3486—74....	Governor of Montana	For defense of settlers in Gallatin Valley.
3152 } 74.... 3411 }	Sheriff at Colfax, La	To assist in arrest of murderers.
3615—74....	United States marshal northern district of Tennessee.	To assist the civil authorities of Coffee County in executing the laws, two deputy marshals having been killed.
3623—74....	United States marshal northern district Alabama, through Department of Justice.	To prevent threatened murders and assist in executing the process of the courts.
3695—74....	Commissioner of Internal Revenue through Secretary of the Treasury.	To assist in enforcing the internal-revenue laws in Western North Carolina.
3714—74....	United States deputy marshal	To assist in making arrests in Floyd and adjacent counties in Georgia.
3813 } 74.... 3882 }	United States deputy marshal	To assist him in making arrests in Tennessee for violation of the enforcement act.
3823—74....	Citizens, through Members of Congress.	To prevent a conflict at Belmont, Sumter County, Ala.
3754 } 74.... 3798 }	Governor of Louisiana	To protect the State government against an insurrectionary movement.
3856—74....	Hon. W. R. Steele, Delegate from Wyoming Territory.	Desires that the cavalry now there be not withdrawn from that Territory, but more sent, if possible, to protect settlers against Indians.
3901—74....	United States deputy marshal	To assist in making arrests in Union, Towers, and Habersham Counties, Georgia.
3897—74....	Treasury Department	To accompany Treasury party with Government funds from Kansas City to Santa Fé and return.
3990—74....	United States commissioner northern district Alabama.	To preserve the peace and prevent violence at Athens, Ga., during State election.
4007—74....	Citizens of Little Colorado. N. Mex.	To keep up the post of Fort Tulerosa for their protection.
4008—74....	W. M. Turner, Jacksonville, Oreg., through Hon. J. H. Mitchell.	To garrison Camp Warner, Oreg., (abandoned) and for protection of settlers against Indians.

E. D. TOWNSEND,
Adjutant-General.

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REPORT OF THE INSPECTOR-GENERAL.

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REPORT

OF

THE INSPECTOR-GENERAL.

WAR DEPARTMENT, INSPECTOR-GENERAL'S OFFICE,
Washington, D. C., October 20, 1874.

SIR: I have the honor to report that the scope of the duties devolving upon the Inspector-General's Department during the past year has been considerably extended by the requirements of the act of Congress approved April 20, 1874, necessitating frequent inspections of all disbursements made by Army officers.

Under General Orders No. 45, War Department, current series, these inspections were required to be made bimonthly, and detailed reports of the same have been transmitted through the regular official channels to this office for examination and correction. This, with the correspondence involved in pointing out errors, and explaining to inexperienced inspectors the proper methods of verifying the disbursing officers' exhibits of their accounts, has involved a great amount of office-work.

Scrutinizing examinations have, in compliance with the law and order above cited, been made of the accounts of disbursing officers. The necessity, economy, and propriety of the expenditures, and their conformity to the laws appropriating the money, have been made subjects of special investigation.

The funds received and expended, with the balances reported due the United States, have been verified by official statements from the Treasury Department and depositaries; and it is gratifying to state that since the existing inspection-system has been put in operation, but three cases of deficiencies or irregularities in the application of funds have been reported, two of which have already been made good to the United States, and it is probable that no loss will ultimately result from the other, as the bondsmen are responsible for the amount.

Inspector-General D. B. Sacket has, during the year, inspected all the military posts in the Department of the Platte, with the exception of two, where the division and department commanders had just visited. He has made many inspections of the money-accounts of disbursing officers, besides several important special investigations, under the direct instructions of the Secretary of War.

Inspector-General E. Schriver has been occupied in inspecting the accounts of the disbursing officers in Washington and at other points. He has also inspected all the recruiting-stations in the Northern, Middle, and Western States, and the affairs of the officers disbursing money in the Freedmen's Branch of the Adjutant General's Office in Virginia, Kentucky, Tennessee, Missouri, and the District of Columbia. He has also had charge of the Inspector-General's Office in my absence.

Inspector-General N. H. Davis was busily occupied until the 14th of May in making various inspections of disbursing officers' accounts in the Divisions of the Atlantic and Missouri, when he was ordered to make

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certain inspections on the Pacific coast, including all the garrisoned posts in the Department of California and at Sitka, Alaska. He has not yet completed this tour of inspection, and has not, therefore, been able to render his annual report.

Inspector-General J. A. Hardie has been engaged during the year in inspecting the accounts of numerous disbursing officers. He also made a special tour of inspection in the West, under the orders of the Secretary of War, for the purpose of promoting economy of administration and retrenchment of expenditures, rendered necessary by the low condition of appropriations. He also, under the orders of the Secretary of War, investigated the Dakota Indian war claims of 1862, in conformity with the act of February 20, 1872; also the Oregon and California Indian war claims of 1872–'73, arising out of the expenses of those States in connection with the operations of the Modoc war. These investigations necessitated visits to Dakota, California, Oregon, and elsewhere, and required careful and thorough examination and considerable labor. The report upon the Modoc war claims is now in progress, and will be finished by the commencement of the session of Congress.

The three assistant inspectors-general, Lieut. Cols. R. Jones and A. Baird and Maj. E. H. Ludington, have been attached to the headquarters of the Military Divisions of the Pacific, Missouri, and Atlantic respectively, and have been engaged in the performance of the duties connected with their offices under the orders of the generals commanding the divisions. They have also, under the orders of the Secretary of War, inspected the accounts of some officers disbursing money within the divisions and not subject to the orders of the division-commanders.

The subject of the employment of servants for officers stationed at remote military posts in the Indian and mining districts of our country is worthy of attention, and seems to demand early legislation. Section 14 of the act of July 15, 1870, makes it "unlawful for any officer to use any enlisted man as a servant in any case whatever." Before this enactment, the Army Regulations permitted an officer, when serving with his company, to take a soldier as waiter, (with his consent,) and the soldier thus employed was so reported and mustered, with a view to having the amount of his pay and allowances charged to the officer employing him.

Soldiers thus serving were required to be equipped in every respect according to the rules of the service, and to attend reviews, inspections, drills, &c.; and many soldiers preferred this service to doing guard and other military duties.

Since the prohibitory enactment, frequent emergencies have occurred where it has been absolutely impossible for officers to hire civilian servants at any price, and they have been driven to the alternative of performing servants' work themselves and neglecting their appropriate duties, or violating the law by using the voluntary labor of soldiers. Even when officers, in their efforts to avoid this, have engaged servants in the Eastern States and transferred them at an expense they could illy afford to their remote stations, in most cases they soon found themselves destitute, as the servants would leave for positions more remunerative than the officers could offer. Moreover, it often occurs that fear prevents civilian servants from accompanying officers, when ordered to posts, or going upon expeditions in the vicinity of hostile Indians.

Besides, many have declined going to places where they were debarred the usual pleasures of civil life; so that it is seldom that a civilian servant can be induced to remain any great length of time at any of our frontier stations.

It would be a violation of the law if a commissioned officer employed

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and paid an enlisted man who, with his own consent, in the intervals of military duty, performed servant's work for him. The officer must, therefore, when he cannot procure the services of a civilian, either feed, groom, and attend to his own horse, cook his own meals, wash his own linen, black his own boots, and perform all other necessary servant's work, which would leave him but little time to attend to the cares of his men and his other military duties, or he must take upon himself the consequences of violating the law.

If deemed necessary, further arguments might be adduced to prove the expediency and, indeed, necessity for legislation, which will, under certain circumstances and proper regulations, authorize the employment of soldiers as servants by officers, as is now allowed in almost every other army, where the necessities are not so urgent as in ours.

Officers serving at comfortable stations within the settlements where servants can be hired at moderate wages are not affected by this law; but it is those who are doing duty in remote localities, performing the rough work of campaigning in the hostile Indian districts, that suffer from it, and complaints of their inability to secure civilian servants are very general.

A repeal of the law before cited would doubtless meet the exigencies of the service at this time by placing this subject where it formerly was, when no evil was known to result from the working of the system.

The following extracts from the annual report of Inspector-General Sacket are the results of enlarged experience, and entitled to careful consideration:

During my inspection-tour through the Department of the Platte, last summer, my notice was attracted to certain matters to which I most respectfully call attention.

1. *Desertions.*—I find that our Army contains many deserters. It is not an uncommon thing to find men in the ranks who have deserted from the service four and five times, and in some few cases as many as six and seven times. A remedy is much needed and should be devised to prevent this wholesale desertion, or at least to prevent soldiers who have once deserted the service ever re-entering it again.

In the Department of the Platte, soldiers convicted by court-martial of desertion or other serious offenses are sentenced (as a general thing) to be discharged the service and be sent to the Iowa penitentiary for the unexpired terms of their enlistments. As far as this goes, it is very well; but there is no way of preventing these characters from re-entering the Army after being released from prison. There should be a law enacted requiring every soldier convicted and sentenced to the penitentiary to be indelibly marked with a capital letter on the hip, indicating the offense for which he was imprisoned and discharged the service.

This would in no way injure a man's prospect or chances for getting work, but would prevent his ever entering the Army again, a thing very much to be desired. If these desperate and hard cases could be kept from re-enlisting, a far better class of men would soon fill the ranks of our army.

Desertions from regiments serving in the Indian country might in a great measure be prevented by sending to companies none but thoroughly-instructed men to fill vacancies in the ranks. It would be better to keep recruits at the recruiting-depots for two years, until well and thoroughly instructed in all their military duties.

Those men who enlisted with the intention of deserting, the drunkards, the thieves, &c., would show their hands long before the two years expired.

The expense of transporting these worthless characters to the Far West would be saved to the Government, and the men sent to the regiments would prove valuable and efficient soldiers for the three remaining years of their enlistment.

The French troops serving in Algeria, and in former times those in Rome, were reported as on *demi-guerre*, half-war, and were never required to drill a recruit. Whenever recruits were sent to them, they had previously been thoroughly and completely instructed in all their military duties, and stepped at once into the ranks, capable of performing all the duties required of the old soldiers.

That portion of our Army serving in the Indian Territory is most certainly on *demi-guerre*, and should not be required to drill recruits. Soldiers sent to them should be able-bodied, sober, and thoroughly instructed in all the duties they may be called upon to perform.

Every colonel or captain would certainly prefer having the services of a well-instruct-

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ed, good, and sober soldier for three years than that of an uninstructed, drunken, worthless fellow for five.

2. *Married soldiers.*—The recruiting-regulations, paragraph 930 Revised Army Regulations, say: "No man having a wife or child shall be enlisted in time of peace without special authority obtained from the Adjutant-General's Office through the superintendent."

An additional regulation is much needed to prohibit recruiting, company, and in fact all other officers giving a soldier the permission to marry after he is enlisted, without special authority obtained from the Adjutant-General's Office.

There is very little use of the above paragraph of the recruiting-regulations, if any officer can give a soldier permission to marry as soon as he is enlisted.

A regulation is also much needed, inflicting some punishment on soldiers who marry without proper permission.

Military posts are sometimes overrun with the wives of enlisted men. It is frequently the case that company-commanders do not know the number of married men in their companies. These women manage to get shanties to live in, to have fuel, to eat, and, in case the company changes its station, to get transportation for themselves and their effects; and in the majority of cases, the lumber for the construction of the shanties, the fuel, the rations, the transportation, &c., are made in some way out of the Government.

It is well known that it requires about as much transportation to move four laundresses as it does to move a whole company of men.

In my opinion, laundresses can be dispensed with in the Army, just as well as not. A man can be detailed on daily duty to do the washing of the company with the same propriety as men are now detailed to do the cooking of the company. I cannot see why four or five men in a company should enjoy privileges that cannot be granted to all the men of the company. Doing away with laundresses would be a move in the direction of great economy.

Although the ratio of desertions from our Army has materially diminished during the past year, yet the number still continues so great as to make this one of the most serious and perplexing evils we have to encounter in our service, and, as Colonel Sacket very justly remarks, a remedy is much needed.

Many of our superior officers have used their best endeavors to ascertain the causes which have been in operation to deprive our Army of so many men by desertion within the past ten years, but as yet no satisfactory solution of the question seems to have been reached.

Major-General Schofield, commanding the Military Division of the Pacific, after having caused searching investigations to be made upon the subject among a large number of deserters, says:

That the general evidence obtained from them appeared to establish three causes for the majority of desertions:

1st. Inattention on the part of the officers to secure them proper and sufficient food.

2d. Acts of officers and non-commissioned officers evincing prejudice or cruelty toward them.

3d. The too hard labor required of them.

He continues:

I was at first disposed to attach importance to this evidence, and issue orders and institute proceedings accordingly, but, on placing it in the hands of the assistant inspector-general for corroboration, found that those officers from whose companies most desertions had occurred owing to the above-stated causes were the most scrupulous in conforming to the requirement of the regulations in looking after the welfare of their men, inspecting their food, and maintaining discipline, and that the men of their companies were most contented and best disciplined.

Inspectors have always been, and still are, instructed to invite enlisted men to come forward and state any causes of dissatisfaction they may know to exist, but no complaints have ever been presented through inspecting officers.

The evidence adduced from our inspection-reports justifies the conclusion that one of the chief causes of the numerous desertions from troops serving in the West, and especially within the mining-districts, may be found in the fact that labor there is in demand at much higher wages than soldiers receive from the Government, and that the protection given to deserters by their employers generally precludes the possibility of their apprehension by the military authorities.

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That our soldiers are better fed, clothed, and paid than those of any other army in the world, and, as a general rule, are kindly treated and properly cared for, does not admit of a question; but they do not, any more than the frontier settlers who harbor and protect them, seem to look upon desertion as a violation of their oaths of enlistment, or as a crime of much turpitude. I am, therefore, fully impressed with the conviction that the remedy suggested in my last annual report would prove more efficacious in suppressing the evil than any other that has been suggested.

It is, *that desertion be constituted, by legislative enactment, a felony cognizable by our civil courts of criminal jurisdiction, the offenders to be arrested by marshals and deputies like other criminals; but this jurisdiction to be concurrent with that of military courts.*

This, I am confident, would have the effect of educating and impressing the public mind with the proper sense of the heinousness of the offense, and prevent evil-disposed persons from giving aid and protection to deserters.

The following-named officers are now serving as acting assistant inspectors-general, viz: Lieut. Col. E. S. Otis, Twenty-second Infantry; Lieut. Col. A. McD. McCook, Tenth Infantry; Maj. A. W. Evans, Third Cavalry; Capt. W. W. Sanders, Sixth Infantry; and Capt. G. B. Russell, Ninth Infantry, and attached respectively to the headquarters of the Departments of Dakota, Missouri, Arizona, the Gulf, and Texas.

Lieut. Col. James Van Voast, Sixteenth Infantry; Lieut. Col. S. B. Holabird, deputy quartermaster general, and Maj. O. D. Greene, assistant adjutant-general, have been designated to make the bi-monthly inspections of certain disbursing officers' accounts.

Herewith I have the honor to forward the reports of the inspections made of disbursing officers' accounts under the act of Congress of April 20, 1874.

Respectfully submitted.

R. B. MARCY,
Inspector-General U. S. A.

The SECRETARY OF WAR.

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REPORT OF THE JUDGE-ADVOCATE-GENERAL.

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REPORT

OF

THE JUDGE-ADVOCATE-GENERAL.

WAR DEPARTMENT, BUREAU OF MILITARY JUSTICE,
Washington, D. C., October 1, 1874.

SIR: In compliance with instructions contained in circular from the Adjutant-General's Office, under date of the 8th ultimo, I have the honor to submit, for the examination and consideration of the Secretary of War, the following statement of the operations of this Bureau since the date of my last annual report of 1st October, 1873:

Number of general court-martial records received, reviewed, and registered, 2,591.

Number of garrison and regimental court-martial records received, reviewed, and registered, 11,207.

Number of special reports made upon court-martial proceedings, and applications for remission of sentences, and miscellaneous questions of law, &c., 918.

Abstracts of proceedings of trials furnished upon official application of the War and Treasury Departments, 3,008.

Copies of records furnished under the ninetieth Article of War, pages, 5,347.

It will be observed that the number of records of trial reviewed during the past year falls short of that of the preceding year by twenty-two hundred and ninety, a result which may be safely accepted as evidencing a gratifying improvement in the *morale* of the Army.

The records of trial by general court-martial have, in the above classification of official action, been separated from those of garrison and regimental courts, with a view of indicating how vast a proportion of the offenses tried were petty in their character, and therefore the subjects of the most subordinate military jurisdiction.

While in some of the branches of official labor there has been a falling-off from the preceding year, and in others an increase, the general average has not been diminished in any marked degree.

Very respectfully, your obedient servant,

J. HOLT,
Judge Advocate-General.

E. D. TOWNSEND,
Adjutant-General, United States Army.

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REPORT OF THE QUARTERMASTER-GENERAL.

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REPORT
OF
THE QUARTERMASTER-GENERAL.

QUARTERMASTER-GENERAL'S OFFICE.
Washington, D. C., October 10, 1874.

SIR: I have the honor to submit the annual report of operations of the Quartermaster's Department during the fiscal year ending 30th June, 1874:

On July 1, 1873, the balance on account of appropriations for years prior to 1st July, 1870, remaining to the credit of the Quartermaster's Department in the Treasury undrawn, was, by report of last year..		$1,637,886 00
Amount placed to the credit of appropriations during the year by deposits of funds for redistribution and of amounts received from sales to officers of public property purchased prior to July 1, 1870.....		186,091 15
Amount expended for other departments prior to July 1, 1870, and refunded by them during the last fiscal year.....		393,924 29
Requests for requisitions issued prior to and canceled within the year.....		110 00
Total.....		2,218,011 44
Requisitions on settlements made at the Treasury of claims and accounts.....		1,297,029 92
Balance to the credit of appropriations for periods prior to July 1, 1870, remaining in the Treasury June 30, 1874.....		920,981 52
Appropriations for the fiscal year ending June 30, 1871.		
Balance in the Treasury July 1, 1873.....		$259,505 40
Amount placed to the credit of appropriations during the year by deposits of funds for redistribution and of amounts derived from sales to officers of public property purchased during the year ending June 30, 1871.....		146,340 24
Amount expended for other departments during the fiscal year ending June 30, 1871, and refunded by them during the last fiscal year....		8,975 67
Total.....		414,821 31
Requisitions on settlements made at the Treasury of claims and accounts.....		25,691 11
Balance in Treasury June 30, 1874.....		389,130 20
Appropriations for the fiscal year ending June 30, 1872.		
Balance in the Treasury July 1, 1873.....		$1,030,712 12
Amounts placed to the credit of appropriations during the year by deposits of funds for redistribution and of amounts derived principally from sales to officers of public property purchased during the year ending June 30, 1872.....		92,483 09
Amount expended for other departments during the fiscal year ending June 30, 1872, and refunded during the last fiscal year.....		22,857 79
Total.....		1,146,053 00
Remitted to disbursing officers during the year, on requests of the Quartermaster-General.....	$33,361 89	
Requisitions on settlements made at the Treasury of claims and accounts.....	124,453 96	
Amount transferred to the Ordnance Department for expenditure in the manufacture of knapsacks, haversacks, canteens, and great-coat straps.....	20,802 50	
		178,618 35
Balance in the Treasury, July 1, 1874.....		967,434 65

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Appropriations for the fiscal year ending June 30, 1873.

Balance in Treasury July 1, 1873		$421,159 00
Appropriations for deficiencies, act of June 22, 1874		565,000 00
Amount placed to the credit of appropriations during the year, by deposits of funds for redistribution, and of amounts derived from sales to officers of public property purchased during the year ending June 30, 1873		512,292 27
Amount expended for other departments, and refunded by them during the year		1,173 02
Requests for requisitions issued prior to and canceled within the year		1,271 47
Total		1,500,895 76
Remitted to officers for disbursement on requests of the Quartermaster-General	$240,098 90	
Requisitions on settlements made at the Treasury of claims and accounts	503 914 75	
		744,013 65
Balance in the Treasury July 1, 1874		756,882 11

Appropriations for the fiscal year ending June 30, 1874.

Appropriations for fiscal year		$15,498,820 61
Amounts placed to the credit of appropriations during the year by deposits of funds for redistribution, and of amounts received from sales to officers, &c., of public property		183,465 13
Amount received from the Ordnance Department for repair of arsenal at Charleston, S. C		500 00
Total		15,682,785 74
Remitted to disbursing officers during the year on requests of the Quartermaster-General	$13,135,452 57	
Requisitions on settlements made at the Treasury of claims and accounts	79,593 73	
		13,215,046 30
Balance in the Treasury July 1, 1874		2,467,739 44

The balances of appropriations undrawn by the Quartermaster's Department July 1, 1874, were as follows:

Appropriations.	For what fiscal years.					Total.
	Prior to July 1, 1870.	1870–'71.	1871–'72.	1872–'73.	1873–'74.	
Regular supplies	$210,405 41	$83,936 73	$91,075 03	$81,163 44	$237,486 45	$704,067 06
Incidental expenses	111,791 61	71,373 85	126,442 66	169,612 74	47,981 57	527,202 43
Purchase of cavalry and artillery horses	28 54	13,594 27	27,983 31	54,544 04	.....	96,150 16
Barracks and quarters	8,093 81	39,203 31	82,576 25	67,716 88	52,862 65	250,452 90
Transportation of the Army	339,128 79	131,684 54	630,702 78	156,797 49	1,124,593 10	2,382,906 70
Transportation of officers' baggage	8,570 32	.....	.....	.....	.....	8,570 32
Clothing of the Army	208,508 22	49,315 90	8,537 10	11,809 15	383 93	278,554 30
Appropriation for stoves	34,454 82	21 60	117 52	.....	.....	34,593 94
National cemeteries	.....	.....	.....	877 02	3,053 18	3,930 20
Hospitals	.....	.....	.....	31,398 69	1,428 06	32,826 75
Expenses of sales	.....	.....	.....	9,180 07	.....	9,180 07
Headstones for soldiers' graves	.....	.....	.....	163,866 25	993,950 00	1,163,816 25
Monument at Salisbury, N. C	.....	.....	.....	10,000 00	.....	10,000 00
Totals	930,981 52	389,130 20	967,434 65	756,965 77	2,467,738 94	5,502,251 08

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The accounts and vouchers which have been examined in this Office since the last annual report show approved disbursements as follows:

On account of appropriations for years prior to July 1, 1870	$509,490 59
For the fiscal year ending June 30, 1871	29,600 56
For the fiscal year ending June 30, 1872	447,693 62
For the fiscal year ending June 30, 1873	7,751,606 52
For the fiscal year ending June 30, 1874	9,624,557 40
Total	18,362,948 69

Appropriations are charged with these disbursements as follows:

Appropriations.	For what fiscal years.					Total.
	Prior to July 1, 1870.	1870–'71.	1871–'72.	1872–'73.	1873–'74.	
Regular supplies	$65,884 83	$2,898 31	$94,828 01	$2,377,482 00	$3,456,549 20	$5,997,642 35
Incidental expenses	51,165 97	5,878 52	48,602 18	573,552 38	1,050,418 36	1,729,617 41
Purchase of cavalry and artillery horses	266,650 52	86 72	8,173 74	195,939 30	66,805 23	537,655 51
Barracks and quarters	32,437 62	6,222 98	61,140 95	709,561 10	1,294,818 66	2,104,181 31
Transportation of the Army	88,465 79	13,915 66	206,580 66	3,088,308 63	2,327,005 59	5,724,276 33
Transportation of officers' baggage	635 10	.....	.....	.....	.....	635 10
Clothing of the Army	879 28	47 72	14,315 42	448,661 45	1,078,214 22	1,542,118 09
Stoves	731 09	.....	52 75	205 33	.....	989 17
National cemeteries	1,335 63	550 65	13,452 23	143,868 17	219,680 91	378,887 59
Collecting, organizing, and drilling volunteers	1,304 76	.....	.....	.....	.....	1,304 76
Transportation of insane volunteers	.....	.....	547 68	248 58	78 30	874 56
Hospitals	.....	.....	.....	44,820 87	52,415 17	97,236 04
Expenses of sales	.....	.....	.....	819 93	322 15	1,142 08
Headstones for soldiers' graves	.....	.....	.....	14,165 95	6,772 22	20,938 17
Army contingencies	.....	.....	.....	18 84	346 30	365 14
Fire-proof building at Jeffersonville	.....	.....	.....	4,182 48	.....	4,182 48
Preservation of clothing, &c	.....	.....	.....	135,182 12	50,362 33	185,544 45
Erection of barracks at Jeffersonville	.....	.....	.....	2,333 39	.....	2,333 39
Mojave claims	.....	.....	.....	12,256 00	1,375 00	13,631 00
Construction of military telegraph	.....	.....	.....	.....	19,257 89	19,257 89
Repairing arsenal at Charleston, S. C	.....	.....	.....	.....	135 87	135 87
Totals	509,490 59	29,600 56	447,693 62	7,751,606 52	9,624,557 40	18,362,948 69

Attention is invited to the fact that accounts for the last fiscal year, ending June 30, 1874, to the amount of $9,624,557.40, had been examined in this Office by the time the year expired. The appropriations for the year amounted to $15,498,820.61.

Three thousand and fifty-seven money-accounts were received during the fiscal year; 1,778 were in the Office at the beginning of the year. Of these, 4,357 were examined and disposed of, and 478 remained unexamined on June 30, 1874.

Four thousand seven hundred and twenty-three property-returns were examined during the year, leaving but 55 undisposed of at its termination.

Recent changes in the laws and in the regulations have very much increased the labor of examining these accounts and returns. Formerly the administrative examination only was made here in order to determine the propriety of expenditures and check, and disallow all expenditures for objects not sanctioned by law, and regulations, and orders, and all purchases and payments at extravagant and improper rates.

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The task of final examination and verification of amounts, and of calculations and details of vouchers, of the absolute correctness of accounts-current, was left to the Treasury, whose accounting officers, Auditors, and Comptrollers are charged with the final settlement of accounts. The examinations of this Office were preliminary, and intended to assist these officers in the final settlement by pointing out any and all improprieties discovered by this administrative examination.

Under the act of 23d June, 1870, for settlement of accounts for disbursements during the war by officers whose final settlements have been delayed in consequence of errors of various kinds inevitable in the haste and occupation of military operations on a great scale, but involving no fraud or intentional wrong-doing, 281 settlements have been made during the year, involving the amount of $99,839.91.

Very stringent measures were taken in order to prevent the incurring of debts or liabilities beyond the amount of the appropriations granted by Congress for the service of the Quartermaster's Department during the year ending on the 30th of June, 1874. The employment of soldiers on extra duty was in a great measure stopped. The repair of buildings, purchase of the material for the repair and for the construction of new buildings requiring the aid of skilled labor, was arrested. Many clerks and other civilians employed, and very necessary to the efficient support and maintenance of the Army and of its operations, were discharged; the wages of those retained were reduced below the usual and proper rates of compensation.

This reduction was submitted to from necessity by men employed on the frontier and at military posts during a time of general depression of industry, when it was difficult for one out of place to find employment.

These measures, while they produced much inconvenience, caused some suffering, and, for want of means of taking care of public property, caused some loss, were at least generally successful in preventing any excess of liabilities over the appropriations.

In Texas and in Arizona, owing to a local misconception of the instructions of the War Department, the employment of soldiers on extra duty, labor, and pay continued after it ceased in other Departments, and a deficiency-estimate of $20,000 has been submitted to provide means to pay up the liabilities thus incurred.

While there is thus a deficiency on account of the appropriation for incidental expenses, there remains at this date on account of other appropriations a considerable sum in the Treasury undrawn, subject to reduction, however, on final settlement of all outstanding accounts.

There are always at the end of the year many accounts unsettled for supplies delivered in the latter part of the fiscal year, and also accounts for contract-service not completed and not adjusted on the 30th June.

The actual total expenditures of the Quartermaster's Department have been very considerably less than the amount appropriated, though in the specific appropriation for incidental expenses a liability estimated at $20,000 has been incurred in excess of this particular appropriation.

I again call attention to the expense and the embarrassment to the military service caused by the law which compels all officers of the Quartermaster's Department, under General Order 68, of 1871, to keep separate accounts with every separate appropriation on account of which they disburse money.

It was shown in the report of this Office for last year that there were then forty-three separate appropriations. The complication of accounts thus required adds to the cost of clerical labor, increases the liability to errors and mistakes, while the strict limitation of the expenditures

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to the objects specified in each particular appropriation for part of the service makes it frequently impossible to pay just debts even when an officer is amply supplied with moneys pertaining to the service of the Quartermaster's Department. The evils of the system are well shown in the report of the committee of the House of Representatives on Expenditures in the War Department. (House Reps., No. 87, Forty-second Cong., third session.)

The Quartermaster's Department is charged with the duty of providing the means of transportation by land and water for all troops and all material of war. It furnishes the horses of the artillery and cavalry, and horses and mules for the trains. It provides and distributes clothing, tents, camp and garrison equipage, forage, lumber, and all material for camps and for shelter of troops and of stores. It builds barracks, hospitals, store-houses; provides wagons, and ambulances, and harness, except for cavalry and artillery horses; builds or charters ships, steamers, and boats, docks and wharves; constructs and repairs roads, railways, and bridges; clears out obstructions in rivers and harbors when necessary for military purposes; provides, by hire or purchase, grounds for military encampments and buildings; pays, generally, all expenses of military operations not by law expressly assigned to some other Department; and, finally, it provides and maintains military cemeteries in which the dead of the Army are buried.

Food, arms, ammunition, medical and hospitals stores are purchased and issued by other Departments, but the Quartermaster's Department transports them to the place of issue and provides store-houses for their preservation until consumed. The corps of officers upon whom all these duties fall has been reduced by time until it is not able to fill well every post at which an officer of activity and ability is needed. Its ranks should be now opened to promotion and appointment.

Many officers of the line, finding themselves charged with heavy responsibility as acting assistant quartermasters, and having insufficient assistance at frontier posts, ask that the enlistment of post quartermaster-sergeants may be allowed by law.

Such non-commissioned officers, selected for experience and fidelity shown in actual service, would be very useful. They would remain at posts in charge of the property when the garrison changed, and thus would preserve knowledge and responsibility now often lost through the frequent change of officers. Such officers also ask that some compensation may be granted them for the risk which they incur in the disbursement of public money, and for the responsibility involved in the care of large amounts of public property.

I have the honor to renew the recommendation heretofore made that an allowance of $10 per month be made in addition to the pay of every line-officer who is detailed by proper authority as acting assistant quartermaster of a military post, when such detail is properly reported to and approved by the War Department. Such an allowance is only just, and it would relieve the service from the feeling that heavy duties are imposed by such detail without any recognition or compensation. Such duties are important, and they should be sought by good officers, not imposed upon the slothful or unwilling.

During the year three hundred and fourteen officers of the line have performed duty in the Department as acting assistant quartermasters.

The officers of the regular establishment of the Quartermaster's Department, all of whom have served through the late war and have had much experience, are stationed at the more important depots and posts. Yet many posts involving heavy responsibility in money and property,

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and calling for good judgment, integrity, and zeal, are occupied by subalterns of the line, on duty as acting assistant quartermasters.

The number of officers of the Quartermaster's Department is now reduced to 66.

There have been three casualties since the last annual report of this office.

Lieut. Col. Hyatt C. Ransom, deputy quartermaster-general, brevet major and brevet lieutenant-colonel, died at Jeffersonville, Ind., on the 16th March, 1874.

Lieut. Col. Frederick Myers, deputy quartermaster-general, brevet lieutenant-colonel, brevet colonel, and brevet brigadier-general, United States Army, died at Santa Fé, on the 7th July, 1874.

Both these officers had served throughout the war, in which they won their brevets for valuable and honorable service.

Capt. Thomas B. Hunt, assistant quartermaster, was tried by court-martial, found guilty, and cashiered on the 26th February, 1874.

DUTIES OF OFFICERS.

A list of officers, with their stations and duties during the year, accompanies this report.

Maj. J. D. Bingham and Maj. M. I. Ludington have been on duty in this Office. Capt. A. J. McGonnigle has also been on duty in charge of the business of the national cemeteries. These officers have given entire satisfaction by the intelligence and fidelity and industry with which they have performed the important duties assigned them.

The principal stations of the officers of the regular establishment of this department during the year have been:

Chief quartermaster of the Division of the Pacific, Col. Robert Allen, San Francisco, Cal.

Col. D. H. Rucker, chief quartermaster of the Division of the Missouri, Chicago, Ill.

Col. Rufus Ingalls, chief quartermaster of the Division of the Atlantic; also in charge of the general depot of the Quartermaster's Department at New York.

Col. Stewart Van Vliet, chief quartermaster of the Department of the Missouri, at Fort Leavenworth, Kans.

Lieut. Col. S. B. Holabird, chief quartermaster of the Department of Texas, at San Antonio, Tex.

Lieut. Col. James A. Ekin, chief quartermaster of the Division of the South; and also in charge of the depot of clothing and equipage and stores at Jeffersonville, station Louisville, Ky.

Lieut. Col. A. R. Eddy, on duty as chief quartermaster of the Department of California, and depot quartermaster at San Francisco, Cal.

Lieut. Col. Rufus Saxton, District of the Lakes, Fourth District, Division of the Atlantic, Buffalo, N. Y.

Maj. A. J. Perry, chief quartermaster, Department of the Platte, Omaha, Neb.

Maj. H. C. Hodges, chief quartermaster, Department of the Gulf, New Orleans, La.

Maj. William Myers, in charge of depot of Washington, now absent in Japan on special duty under orders of the Secretary of War.

Maj. C. G. Sawtelle, chief quartermaster, first quartermaster's district, Division of the Atlantic, New York.

Maj. J. J. Dana, chief quartermaster, Department of Arizona, at Prescott until relieved, then for a time on duty at Fort Leavenworth, and

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now at Philadelphia as chief quartermaster third district, Division of the Atlantic.

Maj. J. A. Potter is on sick leave.

Maj. R. N. Batchelder, chief quartermaster Department of the Columbia, at Portland, Oreg.

Maj. J. M. Moore, Cheyenne depot, Cheyenne, Wyo.

Maj. James Belger, Baton Rouge, La.

Maj. H. M. Enos, still on sick leave.

Maj. B. C. Card, chief quartermaster Department of Dakota, Saint Paul, Minn.

INSPECTION BRANCH.

This branch of the Office keeps the narrative reports of all officers doing duty in the Quartermaster's Department. It examines and prepares for action proceedings of boards of survey, inventory and inspection reports, papers relating to assignment of duty to officers, distribution of hired civilians, and the annual reports of officers. In it are filed and distributed orders, circulars, rolls of honor, and all other printed documents. It prepares the monthly roster of officers of the Quartermaster's Department. It keeps files of letters sent and received, relating individually to officers, agents, and employés of the Department. It has received and distributed about 160,000 letters, reports, and documents during the fiscal year.

A list of officers on duty during the year in the Quartermaster's Department accompanies this report. The number, exclusive of officers of the Quartermaster's Department proper, is 314.

TRANSPORTATION.

The movement during the fiscal year, so far as reported to this time, was by rail, wagon, stage, and vessel, of 44,159 persons, 5,835 beasts, and 99,204 tons of material.

The larger movements of troops were the First Infantry, from the Military Division of the Atlantic to the Department of Dakota.

The Twenty-second Infantry, from the Department of Dakota to the Military Division of the Atlantic.

The Nineteenth Infantry, from the Department of the Gulf to the Department of the Missouri.

The Third Infantry, from the Department of the Missouri to the Department of the Gulf.

The Eighth Infantry, from the Department of the Platte to the Military Division of the Pacific.

The Twenty-third Infantry, from the Department of Arizona to the Department of the Platte.

TRANSPORTATION BY RAILROAD.

Twenty-four thousand six hundred and ten persons, 4,855 beasts, and 45,550 tons of military material were moved by railroad.

Bills for railroad transportation to the amount of $1,051,956.40 have been settled during the year, of which there were paid by disbursing quartermasters $795,790.40, the remainder, $256,165.95, being rendered to this Office, and by it transmitted to the accounting officers of the Treasury for settlement by warrants.

PACIFIC RAILROADS.

There were transported for the Quartermaster's Department by the Union Pacific Railroad 5,823 persons, 1,442 beasts, and 18,723,652 pounds of freight.

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By the Central Pacific Railroad of California, 1,199 persons, 120 beasts, and 2,797,254 pounds of freight.

By the Kansas Pacific Railroad, 1,176 persons, 179 beasts, and 2,116,139 pounds of freight.

By the Sioux City and Pacific Railroad, 325 persons, 40 beasts, and 1,625,414 pounds of freight.

Total movements by Pacific railroads, 8,523 persons, 1,781 beasts, and 25,262,459 pounds of freight.

The accounts for this service over the Pacific railroads, only in part as yet rendered to this Office, are as follows:

For the Union Pacific Railroad	$236,882 01
For the Central Pacific Railroad of California, none.	
For the Kansas Pacific Railroad	47,716 62
For the Sioux City and Pacific Railroad	396 75
Total	284,995 38

Many of the accounts for this service are still in the hands of the officers of the companies, and have not been presented. It is estimated that the cost-value of the service is as follows:

For the Union Pacific	$306,589 98
For the Central Pacific of California	170,000 00
For the Kansas Pacific	98,978 16
For the Sioux City and Pacific	4,761 00
Total as estimated	580,329 14

While under the law, chapter 226, section 2, March 3, 1873, no payments are now made to these railroads, as the amounts earned by them, as appears in settlement of accounts presented from time to time, are drawn from the appropriations of this Department for transportation of the Army, and transferred to the credit of the Secretary of the Treasury as assignee of the respective companies.

The legislation in relation to the earnings of land grant railroads has made it necessary to keep officers of the Army fully informed upon the names of the roads which have received such grants and upon the conditions of the grants, and a general order giving this information was prepared in this Office and published by the War Department, being General Orders No. 98, Adjutant-General's Office, of 1872. The legislation of the last session, forbidding any payments to certain land-grant railroads, made necessary the preparation of another general order on this subject, a draft of which was transmitted to the War Department and published in General Orders No. 107, Adjutant-General's Office, of September 1, 1874, a copy of which accompanies this report.

WAGON-TRANSPORTATION.

There were transported by wagon-trains during the year 18,860 tons of stores.

By stage, 2,255 persons and 7,299 pounds of baggage.

The cost of the wagon-transportation thus far settled during the year is $920,695.97; of stage-transportation, $57,645.25.

Twenty-eight contracts were made for wagon-transportation during the year.

The usual difficulties and embarrassments in making and conducting these contracts have existed, but the work has been successfully accomplished and the troops kept well supplied and at reasonable cost.

The extension of the Texas system of railroads, and its connection

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with the roads west of the Mississippi River, have shortened and improved communication with the posts in the Department of Texas. Supplies are now sent nearly to San Antonio by rail from Saint Louis, and the delays of the Gulf voyage and of the wagon-haul from the coast are avoided in great measure.

WATER-TRANSPORTATION.

Seventeen thousand two hundred and ninety-four persons, 978 beasts, 69,581,706 pounds of military material have been moved by water at a cost, as far as the accounts have been rendered and settled, of $527,835.75. Of this amount $522,978.13 was paid by disbursing quartermasters, and the remainder, $4,857.62, settled through this Office and the accounting-officers of the Treasury.

The following vessels, owned by the Quartermaster's Department, have been in service during the fiscal year:

Steam-tender General McPherson, harbor and bay of San Francisco.

Schooner Margaret, on the Columbia River, Department of the Columbia.

Schooner Matchless, at Key West and the Tortugas, Florida Reefs.

Steam-launch Pulaski, at Fort Pulaski, Savannah Harbor, Georgia, until the garrison was removed, when she was transferred to Fortress Monroe, Hampton Roads.

Steam-launch General Greene, at Fort McHenry, Baltimore Harbor.

The steam-tug A. A. Humphreys, belonging to the Engineer Department, has also been in service in this Department in keeping up communication with the forts on the islands in Boston Harbor, her expenses and repairs being paid by this Department while thus employed.

The cost of this harbor-service during the year by vessels owned by the United States has been $36,160.74. Vessels have been chartered for occasional service to the amount of $24,262.50.

All these expenses are included in the amounts herein stated as paid for water-transportation by disburing quartermasters.

STEAM-LAUNCHES.

Within the last few years great development has been given in Great Britain to construction of steam-launches, vessels of small size, which take the place of sail and row boats in harbor service, with great increase of efficiency, safety, certainty, and speed, and with great economy. They are built in Great Britain and shipped to all parts of the world, and no naval vessel of considerable size is now sent to sea without one. They prove very useful in the service of the sea-coast military posts and fortifications, enabling the garrisons to communicate quickly with each other and with the towns they protect, to procure their supplies fresh and with dispatch, and to make themselves familiar with the land and water within the scope of action and influence of their posts. Several have been purchased or ordered to be constructed, and those already at their posts give great satisfaction. At Fort McHenry, the launch General Greene, built by Mr. A. L. Archambault, of the Kensington Iron Works, Philadelphia, is 50 feet long over all, 12 feet beam, 4 feet deep, single cylinder 9 by 10 inches, horizontal tubular boiler. She has a cabin capable of seating comfortably ten or fifteen persons, protected from the weather, and can carry a large detachment of men on deck. She cost $5,250. She carries the mail and passengers and fresh supplies between Baltimore and the Fort, making three regular trips daily back and forth, distance each way two and a half miles. She makes the passage each

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way in between 15 and 20 minutes, carries usually 35 to 50 pounds of steam, and burns less than 500 pounds of coal daily. Her crew consists of four enlisted and detailed soldiers, and her expenses are about $2.50 per day.

The launch General Jesup was purchased from the New York Safety Steam-power Company, of New York, in June, 1874, for $5,000. She is stationed at Fort Adams, Newport, R. I., and keeps up communication between the military post and the city. She is 56 feet long, 10 feet beam, and 4 feet 8 inches deep. Has a single-cylinder engine 9 by 12 inches, a vertical tubular boiler 50 inches diameter, shell of steel plates ⅜-inch thick. Her cabin seats twelve persons comfortably, but she can carry a large detachment of troops in case of necessity. Her speed in trial-trip, with 90 pounds of steam, was ten miles per hour.

Launches are being constructed by this company for Fort Hamilton, New York, for the fortifications in Boston Harbor, and for those in Pensacola Harbor.

The steam-launch Pulaski, built in February, 1872, by Pusey, Jones & Co., of Wilmington, Del., served as a launch for Fort Pulaski, at the mouth of the Savannah River, till the garrison was withdrawn on account of operations of repair and construction by the Corps of Engineers. She was then sent to Charleston for repair, and is now on duty at Fort Monroe, Hampton Roads, at the artillery-school, where she proves very useful in taking out targets for artillery-practice and keeping up communication with the shores of the harbor.

The appropriation for transportation for the service of the fiscal year was $4,500,000. Of this, the sum of $2,558,133.37 has been paid for rail, water, wagon, and stage transportation.

The purchase of means of transportation, beasts, wagons, harness, hire of teamsters and others employed in the work of transportation, bringing water from a distance to military posts, digging wells, building and repairing wharves, purchase of lumber, boats, &c., has cost $817,233.03. A balance of over $1,000,000 remains undrawn as yet from the Treasury, which will be consumed in the settlement of accounts for transportation over Pacific railroads, and other accounts for transportation service which have not yet reached this office for settlement.

TRANSPORTATION IN PREVIOUS FISCAL YEARS.

During this fiscal year accounts for transportation service in previous years have been received at this Office, and referred to the accounting officers of the Treasury for settlement as follows, viz:

For railroad service	$331,835 17
For water-transportation	104,808 68
For wagon-transportation	144,229 63
For stage-transportation	6,252 23
Miscellaneous transportation claims, tolls, ferriages, telegraph, &c	187,926 92
Total	775,052 65

INDEBTED RAILROADS.

At the close of the war, under Executive orders of 8th August and 14th October, 1865, there was sold on credit to various railroad companies, principally in the South, railroad material to the appraised value of $7,556,033.95. There remained due and unpaid from certain of these railroads on 30th June, 1873, $4,658,924.07. During the fiscal year ending 30th June, 1874, interest has accrued upon this indebtedness,

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and expenses have been incurred to the amount of $98,479.77. Payments in cash and in transportation and postal earnings have been made to the amount of $116,790.91.

On the 1st of July, 1874, there remained an indebtedness, to be collected by the Quartermaster's Department, of $1,897,397.03, not including the sum of $43,754.40 due from the Mississippi, Gainesville and Tuscaloosa Railroad, which is bankrupt, nor the amount due from the East Tennessee and Virginia, the East Tennessee and Georgia, the Nashville and Chattanooga, and the Nashville and Decatur Railroads, which is $2,699,470.60, and which are compromised, under the act of 3d March, 1871, for the sum of $1,265,000, and made payable to the assistant treasurer of the United States at the city of New York.

The actual decrease of the debt during the fiscal year, including payments of accrued interest, but excluding the reduction by compromise under the law, is $28,311.14.

A tabular statement giving the particulars of this debt in detail accompanies this report.

The Alabama and Chattanooga Railroad settled its accounts during the year by payment in cash and by transportation and postal service to the amount of the balance due, $4,037.74.

The Alexandria, Loudon and Hampshire, the Mobile and Ohio, and the Southwest Branch of the Pacific Railroad of Missouri, now part of the Atlantic and Pacific Railroad, reduced their indebtedness, respectively, $2,387.20, $31,653.56, $14,182.30; total, $48,222.86, in addition to paying, on account of interest, $5,559.71; making the total payments $53,782.57.

The debt of the Edgefield and Kentucky, the McMinnville and Manchester, Memphis, Clarksville and Louisville, Memphis and Little Rock, Nashville and Northwestern, and the Selma, Rome and Dalton Railroad Companies has increased $83,262.67. These companies paid during the year on account of their debts $8,367.85.

In addition to the amounts received and applied toward the liquidation of these debts, there are in the Treasury Department unadjusted accounts for services of these companies for public transportation amounting in gross to $53,883.22; and there is due the same companies for postal services $136,073.43. Of these sums, amounts on account of transportation $51,646.74, and on account of postal services $32,755.75, were earned before 1st July, 1872; and, under the operation of the act of 20th June, 1874, directing that from and after 1st July, 1874, and for each year thereafter, the Secretary of the Treasury shall cause all unexpended balances of appropriations which have remained on the books of the Treasury for two fiscal years to be carried to the surplus fund and covered into the Treasury, there is no money to carry to credit of these companies on the debt account, and the Treasury cannot settle these accounts.

Some roads, largely indebted to the Government and which have given bond for the application of their postal earnings to the payment of their debt, still refuse or neglect to give the order deemed necessary by the Post-Office Department before the money can be applied as required by the contracts and bonds. Some of these earnings have lapsed into the surplus fund, some remain in the Treasury, not paid to the railroads but locked up. Not being turned over to this Department, these sums cannot by it be placed to the credit of the indebted and delinquent railroads in settlement. Some provision of law for collection of this money and settlement of the debt, as far as it will go, is desirable.

Suits are in progress against several railroads on account of these

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sales, particulars of which will be found in the report of the officer in charge of the transportation branch of this Office which accompanies this report.

The total collections on account of the sale of railroad material on credit to these southern and southwestern railroads, up to 30th June, 1874, was $5,240,423.84.

Thirty-four railroads have paid their debt with interest and expenses in full. Sixteen yet remain in debt to the United States.

BARRACKS AND QUARTERS.

During the fiscal year the erection of 140 new buildings has been authorized. They are at military posts in twenty-two States and eight Territories, and the estimated cost is $313,233. They are barracks for officers and soldiers, stables, store-houses, guard-houses, laundresses' quarters.

Wharves have been constructed and repaired to the amount of $14,797.

Repairs and alteration of public buildings have been authorized by the War Department, at the estimated cost of $218,000.

NEW POSTS.

In the last annual report of this Office, it was stated that two new four-company posts had been authorized in that year in Arizona. One, Camp Lowell, near Tucson; the other, New Camp Grant, near the mouth of the San Carlos River. The cost of the two not to exceed $35,000, and the troops to furnish the labor needed. The Secretary subsequently increased the allowance by $50,000, making $85,000 in all. It was also reported that the expenditure of $20,000 had been authorized for sheltering men and officers at Tulerosa, N. Mex.

It appears from reports received at this office that about $5,000 were expended at this place, when the Indian Office concluded to remove the Indians and the work ceased. Six thousand dollars of the funds devoted to Tulerosa was, by authority of the War Department, transferred to the completion of buildings at Fort Bayard, N. Mex., and $9,000 was assigned to construction of a new post at Horse Creek, eighteen miles from Tulerosa.

Congress having by the act of 3d March, 1873, Army appropriation bill, authorized the establishment of two new posts between the Missouri River and Fort Ellis, the Secretary of War authorized the erection of the buildings, to shelter six companies of cavalry, at the North Pacific crossing of the Missouri River, near Fort Abraham Lincoln, three two-company barracks, with kitchens and wash-rooms, seven stables, one building for laundresses, guard-house, granary, subsistence store-house and office, quartermaster's store-house and office, three buildings for officers' quarters, and one for commanding officer of the post, twenty-two buildings in all, at an estimated cost of $90,903.46. The work was executed, and with such discretion and economy that it is reported that the whole cost will not exceed $74,000.

The other new post authorized by Congress has not been established yet.

The expenditure authorized for construction and repairs during the year has been distributed as follows:

In Department of Dakota	$144,316 00
In Department of Arizona	64,939 00
In Department of the Platte	150,827 00
In Department of the South	33,662 00

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In Department of Texas	$84,549 00
In Department of the Gulf	5,966 00
In Department of the East	47,429 00
In Department of the Missouri	50,258 00
In Department of the Columbia	47,490 00
In Department of California	22,563 00
Total	651,999 00

Of this, however, $43,370 were to be postponed until after 1st July, 1874, the new appropriation became available.

HOSPITALS.

The expenditure for construction, repair, and alteration of hospital buildings authorized by the Secretary of War has been $85,077, of which $9,500 was to be expended only after the beginning of the present fiscal year. The total sum withdrawn from the Treasury, from the appropriation of $100,000 for hospitals, was $98,571.94.

Forty-seven hospitals have been repaired, altered, or constructed during the year.

PISÉ.

During the year a short tract on construction in Pisé, beaten and rammed earth, much used in Southern Europe, was published and distributed to officers on duty in the Quartermaster's Department. It was principally extracted from Creecy's Dictionary of Civil Engineering, originally taken from the work of Rondelet, Art de Batir.

Nine buildings, officers' quarters, stables, &c., have since been constructed of this material at Camp Verde, Arizona, with great advantage in economy. The walls were built by two or three soldiers, under direction of one skilled mason, with greater ease and rapidity than those built of adobes, and at about two-thirds only of the cost of adobe walls. The walls appear to be very solid, and when covered with an exterior coat of lime, or of hydraulic cement, answer perfectly their purpose.

At Camp Verde the use of this material enabled the officer in charge of the construction to provide for one more company than at first intended, without exceeding the original appropriation for the post.

APPROPRIATION FOR DEPOT BUILDINGS AT SAN ANTONIO.

The Secretary of War having directed that no action be taken looking to erection of this depot until further instructions should be issued, and no such instructions having been received, the depot has not been commenced. The appropriation was made on the 3d of March, 1873.

I consider the erection of a fire-proof building for thesorage of military supplies at this central point in Texas of great mportance and economy. San Antonio must remain a proper and convenient place for a depot for troops on the Rio Grande frontier. It will soon be a railroad center, and its importance and convenience will not be lessened by the increased facility of supply which the railroads will afford. Wagon-roads now radiate from San Antonio to all points south and west, and the Department now pays for rents of various buildings occupied by the Army in that city about $25,000 a year, much of which could be saved by the expenditure of $100,000 in construction of a depot for the Quartermaster's Department upon land given by the city to the United States for that purpose, upon a promise of the War Department that the much-needed depot should be erected thereon.

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JEFFERSONVILLE DEPOT.

This, which is the largest military depot and store-house for clothing and camp and garrison equipage, having been completed, has long been occupied. It justifies the expense of its construction, being in a most convenient position for the supply of troops from the Atlantic to the Rocky Mountains.

The supplies being concentrated under eye of a single watchman in the central watch-tower, who can see all the doors of the building, and the buildings themselves being fire-proof, the expense of conducting the depot, of watch and guard, is much less than at any other large depot.

The neighboring country supplies many military stores, and the population is ready to supply labor in the manufacture of clothing and equipage.

The planting and improvement of the court-yard and the grounds surrounding the building have been begun upon a design prepared by the eminent landscape architect, Mr. Fred. Law Olmstead.

BUILDINGS SOLD.

The sale of fourteen buildings, mostly old store-houses, stables, or buildings of similar character, has been ordered.

BUILDINGS AND RESERVES TRANSFERRED.

On 26th June, 1873, Charleston Arsenal was transferred to the Quartermaster's Department for use of the garrison of that city, and has since been known as Charleston barracks.

On 23d August, 1873, information was received that the Interior Department had turned over Fort Walla-Walla again to the War Department for temporary military occupation.

The barracks and other buildings at Fort Brooke, Tampa Bay, Florida, were, on 13th February, 1874, transferred to the custody of the Treasury Department, to be by it retained until other instructions issue.

The buildings at Fort Pulaski, Georgia, were transferred to the custody of the Engineer Department on 6th February, 1874.

The site of Camp Hualpai, Arizona, was transferred to the Interior Department on 22d April, 1874.

SITES OF MILITARY POSTS IN TEXAS.

The unsatisfactory tenure of most of the sites of military posts in the State of Texas has frequently been reported by this Office.

The act of 3d March, 1873, 17 Statutes, 614, authorized purchase of these sites upon certain conditions set forth in the act.

A board of officers convened under this law, having carefully investigated the cases submitted to them, reported in favor of purchase of sites at the following posts at the prices stated, viz:

Fort Brown	$25,000
Fort Clark	7,000
Fort Concho	6,400
Fort Davis	9,000
Fort Duncan	10,920
Fort Griffin	4,200
Fort McIntosh	3,000
Fort McKavitt	15,000
Fort Quitman	3,840
Fort Stockton	12,000
Ringgold Barracks	10,000
	106,360

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The reports of the board, approved by the proper officers, were transmitted to Congress 20th May, 1874, and were printed in Executive Document 280, House of Representatives, Forty-third Congress, first session. Final action was not had, and the United States is still a trespasser on most of these lands, liable to ejectment by civil suit, and to the loss of the costly military posts constructed upon them.

It is very desirable that an appropriation be made, in pursuance of the law, for the protection of the interests of the United States, and in justice to those whose lands are now held by such an unsatisfactory tenure.

MILITARY POSTS ABANDONED.

Orders have been given to break up and abandon Camp Warner, Oregon, and Camp Bowie, Arizona.

ARTESIAN WELL IN WYOMING.

Under the act of June 8, 1872, directing the Secretary of War to expend $10,000 of the military appropriation, or so much thereof as might be found necessary, in boring for water at Fort D. A. Russell, near Cheyenne, Wyo., a well has been sunk to the depth of 1,381 feet, through difficult ground, details of which are given in another part of this report. The drift at this point, itself over 6,000 feet above the sea-level, but 1,000 feet below the pass by which the Union Pacific Railroad crosses the Black Hills Range at Sherman, thirty miles west, is 1,212 feet thick. The auger penetrated 169 feet into the underlying rock—a slate—but no flowing supply of water was found, and, as the further progress of the well threatened to be very expensive, the work has been stopped. Complete machinery and boring-tools were purchased for this work, and are preserved at the depot at Cheyenne, available for use at any other point at which it may be determined to bore for water.

The Union Pacific Railroad has sunk a number of wells west of the Black Hills, and obtained valuable supplies of water in that arid desert.

Flowing wells in the country lying along the base of the Black Hills, and for some hundred mile east thereof, would be of very great value in supplying water for stock, which cannot now be kept on extensive ranges of pasture too distant from the few streams which, rising in the Black Hills, flow eastward.

Several shallow tube-wells have been sunk at Camp Supply, Ind. T., which is now well supplied with water by this means; the tubes are 1½ inch wrought-iron; the depth at which water is reached averages 20 to 30 feet.

POST CEMETERIES.

The usual care has been given to the condition of the cemeteries at the military posts. Interments in that of Fort Columbus, New York York Harbor, have ceased. The cemetery at Fort Clinch, Florida, has been repaired and inclosed.

FIRES.

Six fires have been reported at military posts during the year: On August 3, 1873, four of the cavalry stables at Fort Riley were destroyed; on February 1, 1874, the quartermaster's store-house on pier No. 51, Hudson River, New York, was burned; on February 6 the quarters of

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the commanding officer at Fort A. Lincoln; on March 9 a building used as officers' quarters at Fort Gratiot, Michigan; on April 27 the hospital and company quarters at Alcatraz Island, San Francisco Bay, and on June 27, 1874, a portion of the transportation-corral and grain-stores at Fort Union, New Mexico, were destroyed by fire.

RESERVES DECLARED.

The following three military reserves were declared by the President during the year:

Fort Seward, Dakota Territory, November 25, 1873.

Pike's Peak, Colorado Territory, December 23, 1873.

Sidney Barracks, Nebraska, August 14, 1874.

By the exercise of strict economy, and by refusing to allow repairs and constructions, in some cases much needed, the expenditures on account of the appropriation for barracks and quarters have been kept within the limits of the appropriation.

REGULAR AND MISCELLANEOUS SUPPLIES.

Horses and mules.

One thousand nine hundred and sixty-seven horses have been purchased for the artillery and cavalry remounts and for Indian scouts, at an average cost of $113.74, the whole costing $237,734.57. Two hundred and forty-three mules were purchased at an average price of $134.98, amounting in all to $32,801.72.

Sales of animals.

1,033 horses, condemned and sold for	$44,430 78
366 mules, condemned and sold for	18,068 58
35 oxen, condemned and sold for	748 45
Total, 1,434 beasts for	63,247 81

The following is a summary statement of the number of animals purchased, sold, died, &c., and remaining on hand during the fiscal year:

On hand, purchased, &c.	Horses.	Mules.	Oxen.
On hand July 1, 1873	10,130	10,425	110
Purchased	1,967	243	.....
Taken up, &c	244	91	.....
To be accounted for	12,341	10,759	110
Sold	1,033	366	35
Died	482	536	9
Lost and stolen	207	280	1
Total sold, died, &c	1,722	1,182	45
On hand June 30, 1874	10,619	9,577	65

Army wagons and harness.

On 1st July, 1874, there were on hand 3,022 wagons, 285 spring-wagons, 217 ambulances, wagon-harness for 22,880 mules, and ambulance-harness for 2,389 animals.

There were purchased during the year 309 wagons, 7 spring-wagons, wagon-harness for 149 mules, ambulance-harness for 49 animals.

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The stock in the Army and in store at the end of the year was—wagons, 2,385; spring-wagons, 259; ambulances, 159; wagon-harness for 20,149 animals; ambulance-harness for 1,934.

Iron hubs.

Wheels with iron hubs have been distributed for trial. Time has not yet served to determine their value, but information thus far received tends to show that their general adoption in the trains in very dry regions will be advantageous.

Fuel, forage, and straw.

The issues of these supplies have been—wood, 136,047 cords; anthracite coal, 18,110 tons; bituminous coal, 20,211 tons; of corn, 710,005 bushels; oats, 990,497 bushels; barley, 179,283 bushels; bran, 51,078 bushels; fodder, 58 tons; straw, 3,206 tons.

Increase of fuel.

General Orders No. 18, Adjutant-General's Office, 1874, has provided a remedy for the deficient allowance of fuel complained of at posts whose altitude brings upon them a climate more severe than is generally found under corresponding parallels of latitude.

Clothing and Equipage.

During the fiscal year a full supply of the new uniform for the Army for twelve months was manufactured and issued to the troops. The information received at this Office indicates that it is much liked and gives general satisfaction. The new plaited blouse is, however, an exception to this, and so many complaints against it were received that the Secretary of War has authorized the adoption of a plainer pattern, which, it is believed, will be better adapted to the wants and tastes of the soldiers, and which can be supplied with a saving of about $84,000 per annum.

The tariff of sizes of clothing has been modified, on consultation with Army officers, and is now as follows:

Articles.	1	2	3	4	5	6	7	8	9	10	11	12	Totals.
Boots and bootees	....	....	....	....	3	10	30	35	14	4	3	1	100
Helmets and dress-caps	16	28	22	20	10	4	....	....	....	....	....	....	100
Forage-caps	20	30	25	15	7	3	....	....	....	....	....	....	100
Uniform coats and blouses	30	45	20	5	....	....	....	....	....	....	....	....	100
Great-coats	20	40	30	10	....	....	....	....	....	....	....	....	100
Fatigue-frocks	15	45	30	10	....	....	....	....	....	....	....	....	100
Trowsers	10	45	30	10	5	....	....	....	....	....	....	....	100
Drawers	15	45	30	10	....	....	....	....	....	....	....	....	100

Under the direction of the act of 3d March, 1873, the greater portion of the clothing known as old-pattern, differing from the new and adopted uniform, was sold at public auction after a full advertisement. A list of the articles and an account of the sales accompany this report. The gross proceeds of the sales were covered into the Treasury, as required by the law. The amount was $478,161.79. Sales of condemned clothing, unfit for issue, and sales to officers, made the total amount realized from sale of clothing during the year $766,715.39.

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As the Army appropriation bill for the present fiscal year required such of the old-pattern hats, uniform-caps, forage-caps, uniform-coats, uniform-jackets, and flannel sack-coats as had not been sold and were serviceable, to be used before further purchases of these articles of the style and pattern of the new uniform were made, orders for these issues were given.

On inspection of the old hats, forage-caps and cap-covers, they were found unfit for issue. Long in store, they had deteriorated. The cloth had been attacked by moths; the lacquer on the leather vizors and the varnish on the cap-covers had undergone chemical change, and had become sticky and unfit for use. A supply of these articles of the new pattern is being procured by contract.

Of the following articles a partial supply can be made available, and these are being issued: Uniform jackets, cavalry and light-artillery uniform-coats, ordnance and sack-coats, unlined. Of the latter, some sizes will soon be exhausted. Of infantry-coats, old pattern, only the smaller sizes, Nos. 1 and 2, are on hand. Of lined sack-coats only sizes 2 and 3 are on hand.

The act of 18th June, 1874, gives 10,000 suits of old uniform-clothing, or their equivalent, to the National Hospital for Disabled Volunteers. This has been reserved for transfer to the officer of the institution. Under the act of 20th June, 1873, there were delivered to the home during the year 44,530 pairs of shoes, making a total of 190,308 pairs of shoes delivered under that act.

Very full statements of clothing and equipage on hand, received, and issued, and sold during the year accompany this report.

PRESERVATION OF WOOLEN CLOTHING FROM THE RAVAGES OF MOTHS.

Congress has made several appropriations, from time to time, for the application of the patented process of Cowles & Co. to the clothing of the Army, in order to preserve woolen goods from the moth and cotton and linen articles from mildew. Careful experiments indicated that this process was a great protection against loss from these two causes.

A board of officers took testimony, examined into the details of the process, and reported strongly in favor of its use.

Lately the testimony from the military posts has been less favorable, and information has been received from other sources leading to a doubt whether the protection lasts. Some garments have been found which, though submitted apparently to the process, have since been attacked by moths.

Another board has been ordered to examine the prepared goods and the testimony, in order to determine these important questions with certainty. Time enough has now elapsed to make an absolute decision possible. In the mean time the use of the process has been suspended, and the appropriation for the process, $30,000, made at the last session, has not been used.

I believe that it will be found useful to subject every bale of woolen garments packed in the depots, when first made up, to the effect of a vacuum, in a close chamber exhausted by an air-pump, and to the introduction into the chamber of some gas, such as nitrogen and carbonic oxide, at a temperature high enough to coagulate the albumen in the eggs of the clothes-moth which may have been inclosed with the woolen garments in making up the package. This will cheaply and certainly kill all moths, grubs, and eggs. The packages, whether bales or boxes, are lined with petroleum-paper, which is impervious to the insect, and

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which can be trusted to preserve the contents from all attacks from the outside till broken in order to use.

This process is cheap, rapid, and can be applied to the large stores of clothing in depot, without taking too much time and labor and without breaking the packages and exposing the goods to the attack of moths every time a package is opened. The steam-engine in use at the depots for manufacturing and baling will supply the power, and a stove filled with ignited anthracite, through which the air to fill the chamber after the effect of the vacuum has been obtained, will supply the gases poisonous to insects. They are carbonic acid and carbonic oxide. The nitrogen, which remains unchanged, except in temperature by the fire, is simply a non-supporter of life and a vehicle to carry the heat to every fold and pore of the woolen cloth.

Experiments are in progress at Jeffersonville on this subject, and I have hope of success in thus providing a safeguard for our clothing. A cylindric vessel of wrought iron, like a cylinder-boiler, of sufficient size to contain the bales, is to be provided for this purpose. It will probably be well to pass every bale through this on its first making up, and again at the time it is shipped to any remote post for issue.

OFFICIAL SEALS.

Seals have been supplied to officers shipping stores on account of the Quartermaster's Department, with which every package is sealed in such a manner that it cannot be tampered with in transit without breaking the seals. General Orders No. 37, Adjutant-General's Office, 1874, gives the necessary instructions.

The use of these seals will aid greatly in preventing depredations upon public property, and in fixing responsibility of officers and others for losses which may occur.

PADLOCKS.

A model padlock for the military service was adopted in October, 1873, since which time 1,122 have been supplied to various posts and stations on requisition. They are strong, durable, and secure.

PAYMASTERS' SAFES.

Under direction of the act of March 3, 1873, 128 paymasters' safes in the depots at Jeffersonville and Philadelphia have been transferred to the Post-Office Department, for use in the postal money-order system.

CONTRACTS.

There were filed and examined in this Office during the fiscal year 675 contracts. Of these 215 were for forage: 21,144,553 pounds of oats; 22,787,633 pounds of corn; 2,734,340 pounds of barley; 37,000 pounds of bran; 25,954 tons of hay; 15 for 2,090 tons of straw; 30 for 31,015 tons of coal; 103 for 114,922 cords of wood; 25 for 42,825 bushels of charcoal; 3 for construction of buildings; 50 for transportation; 6 for miscellaneous services; 1 for Army wagons; 13 for clothing, camp and garrison equipage; 26 for national cemeteries; 4 for stationery; 1 for steam-launch; 31 contracts of lease.

FIRE-EXTINGUISHERS.

Careful experiments in this city having shown that a small hand force-pump, known as Johnson's Hand Force-Pump, is quite as efficient in extinguishing flames as the chemical fire-extinguisher, its use has been adopted, and two hundred and fourteen have been distributed to military posts. They have saved much property.

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EXPLORING EXPEDITIONS.

The explorations of the Engineer Department, under Lieutenant Wheeler, have again been aided by the loan of wagons, harness, mules, and by the sale, at cost, of forage and other needful supplies at the military posts within range of the survey. Also by the transportation by this Department of the personnel and material of the survey, its collections in geology and natural history, and its stores and supplies generally.

MILITARY-TELEGRAPH LINE, DEPARTMENT OF ARIZONA.

The act of 3d March, 1873, 17 Statutes, 528, appropriates $50,311.80 for construction of a military telegraph from San Diego, California, to Prescott and Tucson, Arizona, via Fort Yuma and Maricopa Wells.

The disbursement of this appropriation was committed to the Quartermaster's Department, and the line has been successfully constructed, under direction of the general commanding the Division of the Pacific and Department of Arizona, by officers of the Quartermaster's Department and others of the line properly detailed. Great part of the work was done by troops; the material was purchased and transported by the Quartermaster's Department, and the whole line was constructed and put in successful operation within the estimate submitted by this Office, upon which the appropriation was based.

The appropriation did not become available until July 1, 1873. Reconnoissance of the route was begun at Prescott on June 28, 1873, and reached San Diego on the 2d of August. Construction was begun at San Diego on August 28, 1873; at Prescott, September 2; at Yuma, September 20, and at Maricopa Wells on October 11, 1873.

The line was completed to Tucson on December 2, 1873.

Five hundred and forty miles of telegraph were constructed in ninety-seven days.

Reports of construction by Captain George F. Price, Fifth Cavalry, in charge thereof, and by R. R. Haines, superintendent of construction, give detailed information relative to work, location, &c., and accompany this report.

The expenses may be classed as follows:

Equipment-instruments, books, blanks, tools for repairs	$3,584 73
Printing rules and regulations	55 55
Hire of civilians	7,375 38
Purchase of poles	9,252 00
Repairs of injuries before opening the line	44 21
Total	44,842 86
Appropriation	50,311 80
Balance	5,468 94

Of which $5,086.51 is reported in hands of officers, and $382.43, not yet reported in detail, has been expended in the work.

The line has been extensively used. The messages reported from its opening to June 20, 1874, are 5,134, containing 176,657 words.

The expenses of operating and maintaining have averaged $906.74 per month.

The revenue collected from private messages, $757.12 per month.

There were stations at San Diego, National City, and Mountain Springs, Cal., Yuma Depot, Stanwix Station, Maricopa Wells, Camp Whipple, and at Tucson, in Arizona.

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The wire was carried to Florence, and permission to open a station at that settlement was given in return for a liberal donation of poles by its citizens. The office at National City has recently been closed, and that at Mountain Springs has been transferred to Indian Wells.

Since the opening of this line Congress has appropriated, in the sundry civil expense bill for the fiscal year, $4,000 to enable the Secretary of War to extend the military telegraph from Prescott to Camp Verde, and to Camp Apache, Arizona, and has authorized the application of the revenue from dispatches to the expense of operating and maintaining the line, and directed that the charge and control, construction and repair, and operation of the lines in Arizona shall be committed to the Chief Signal-Officer of the Army. This Department has been ready to make the transfer, but to this time the Signal-Office has not signified its readiness to assume charge.

The line has already proved of great utility in military operations against the Apache savages, who have broken out of the reservations. Troops are ordered by it to intercept them; information is given to and from headquarters of every movement, when needed to aid officers in command of scouting-parties when they touch at the military posts for supplies and information, and the cost of the line has been amply repaid in the saving of life and of property, and of expenses in blind pursuit.

To the people of the Territories and to the officers and soldiers of the Army, it has opened speedy communication with their correspondents all over the United States, and it has done much to ameliorate the condition of persons in public and private life whose lot has been cast in this remote portion of the territory of the United States.

NATIONAL CEMETERIES.

Contracts were made after due advertisement under the appropriation of $1,000,000 for erecting headstones in all the national military cemeteries.

Bids received were opened in presence of the bidders on the 6th of September, 1873. Designs for the headstones to be placed on the graves of the known dead, and for blocks to be placed over the unknown, had been adopted by the Secretary of War before the issue of the advertisements.

Contracts were awarded by the Secretary of War as follows:

To Thomas P. Morgan, of Washington, D. C., for marble headstones for known interred in 22 cemeteries, at $3.40 each stone.

To Charles S. Jones, of Washington, D. C., for marble headstones for the known interred in 23 cemeteries, at $3.39 each.

To Samuel G. Bridges, of Keokuk, Iowa, for marble headstones for the known interred in 26 cemeteries, at $3.56 each.

To E. P. Doherty, of Washington, D. C., for granite headstones for the known and granite blocks for the unknown interred in the national military cemetery at Fredericksburg, Va., at $3.95 and $3.50 each, respectively.

To D. C. Sage, of Cornwall, Conn., for marble blocks for the unknown interred in 72 cemeteries, at $2.40 each.

The contracts were all duly signed and executed by the 31st December, 1873, but at the close of the fiscal year none of the headstones had been actually erected. Contractors are at work at the quarries preparing the stones for transportation and erection.

Correspondence with the Adjutants General of the several States have

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shown that the printed list of the dead, prepared from notes of officers directing the removal and collection of the remains from the battle-fields to the national cemeteries, contained many errors. A thorough revision of the lists has been undertaken with the aid of the State records, in order that correct legends may be inscribed upon the stones erected.

By an act approved 3d March, 1873, 17 Statutes, chapter 229, the sum of $10,000 was appropriated for the erection of a granite monument at the Salisbury national military cemetery, in which nearly all the dead are buried in trenches, no records of the places of burial by name having been delivered to the United States authorities when the place was captured.

Designs were obtained from a number of artists, and that prepared by August Von Cleef having been selected by the Secretary of War, advertisements were issued inviting proposals for its construction. A bid within the appropriation was received from Linehau & Co., of Raleigh, N. C., for $9,250, and contract was awarded to them. The guarantors of the bidders, however, have asked that time be allowed them for a thorough examination of the granite-quarry near Salisbury, from which it was intended to obtain the material, before they involved themselves in a bond for the execution of the work. This was granted, and the contract has not yet been executed.

Title to sites of National Military Cemeteries.

Efforts to procure satisfactory title-deeds and cession of jurisdiction over the national cemeteries have been made, but not in all cases with success.

Many of the cemeteries were established during the war, the ground taken possession of as a military measure of necessity. To most of them satisfactory record-titles have now been obtained, and the effort to complete those titles and to obtain cession of jurisdiction in all incomplete cases continues.

Superintendents of Military Cemeteries.

There are sixty-nine cemeteries needing superintendents. Sixty-five were on duty on the 30th June, 1873, nine appointed and six discharged during the year, and sixty-eight were in service at the end of the fiscal year, 30th June, 1874.

The records now show that there are 162,079 known and 179,962 unknown graves in the seventy-six national military cemeteries.

Constructions.

Walls and lodges have been contracted for, and their construction has been pushed as much as possible. Several contractors have failed to execute their work promptly, and thus have caused delay. Several contracts have been declared forfeited, and the work has been undertaken by the officers in charge under this Department. I report progress during the year.

Brick inclosures completed at Memphis, Fort Leavenworth, Fort Scott, Fort Smith, and at Chalmette national cemeteries. Work is in progress at Fredericksburg and Culpeper, Va., Salisbury and Raleigh, Port Hudson, Fayetteville, and Vicksburg. These walls will probably be completed this fall and winter.

Contracts are made for walls at Fort Harrison and Poplar Grove, and Baton Rouge, but the contractors had not begun work at the close of the fiscal year.

A contract has been made to inclose the Mound City, Ill., cemetery

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by an iron railing. The railing has not yet been erected; the work was delayed awaiting the completion of legal proceedings to obtain, as an addition to the cemetery, a strip of land on which to place it.

Lodges.

Superintendent's lodges have been erected at Memphis, Knoxville, Brownsville, Fayetteville, Danville, Glendale, Seven Pines, Raleigh, and Chalmette. The last four were completed by the United States, the contractors having defaulted.

The lodges at Fort Leavenworth and Fort Scott are well advanced; to be completed this season.

It has required frequent and rigid inspections, by trained civil engineers employed for the purpose, to secure good, faithful, and substantial work on these constructions.

Contracts for lodges at the Chattanooga and Wilmington cemeteries, and for a wall at New Berne have been awarded.

Erection of walls and lodges needed at other cemeteries has been postponed, as the works already on hand will absorb all the appropriation available for constructions.

Those to be provided with permanent inclosures are Baton Rouge and Alexandria, La., Andersonville, Ga., Poplar Grove, Yorktown, Seven Pines, Glendale, Fort Gibson, Wilmington, N. C., Fort McPherson, Beaufort, Florence, Grafton, and Brownsville.

Those yet to be provided with permanent lodges are Alexandria, La., Port Hudson, and Baton Rouge, Camp Nelson, Logan's Cross-Roads, Pittsburgh Landing, and Fort Donelson, Fort Gibson, Fort McPherson, Beverly, N. J., Grafton, and Andersonville.

An estimate for the completion of this work, and for the maintenance of the cemeteries during the next year, has been submitted.

During the past year attention has been given to improvement of the drainage and water-supply of the cemeteries. Cisterns and wells have been constructed in some; a thorough system of underdrainage has been applied to several, and this work will be continued as the means are provided by appropriation of Congress from year to year.

City of Mexico National Military Cemetery.

This cemetery, established during the Mexican war, having recently, under the act of Congress for that purpose, been declared a national military cemetery, and placed under charge of the War Department, has been improved and put in good order. An artesian well has been sunk which supplies water for irrigation. The lodge has been enlarged, repaired, and improved in a style suited to the climate. A stable has been erected, walks and drives have been graded, all under the supervision of Dr. Julius A. Skilton, United States consul-general at the city of Mexico, who has been intrusted by the Secretary of War with the local management of the cemetery, and the disbursement of the funds allotted for its care and improvement. A permanent keeper is employed, and labor is hired from time to time as needed.

A national military cemetery has been established at Fort McPherson, Nebraska. For this purpose a tract of 107 acres of the military reserve has been set aside. Four acres of this, temporarily inclosed with a wooden fence, are to be hereafter surrounded by a stone wall. A superintendent has been assigned to it, and the removal of the remains of soldiers and officers interred at Forts Sedgwick and Kearney is in progress.

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The expenditures upon the national military cemeteries for the past year are classed as follows:

Walls	$36,973 40
Lodges	38,761 60
Rents	809 06
Out-houses	4,989 82
Green-houses	4,260 31
Trees and plants	7,021 37
Employés	51,740 23
Drainage	17,254 18
Office furniture	1,598 20
Tools, &c	6,212 27
Superintendents of grounds	10,737 51
Flag-staffs and ornaments	12,498 09
Water-supply	4,902 09
Purchase of land	1,201 12
Interments	966 17
Miscellaneous	17,600 60
Total	267,526 05

Operations for the current fiscal year will be limited, the appropriation at the last session being less than heretofore.

During the past year Capt. A. J. McGonnigle has been in immediate charge of the cemeteries, and his intelligence and zeal have been of great value in the work, which is scattered through a large territory at nearly one hundred different stations.

CLAIMS AND ACCOUNTS.

By section 2 of the act making appropriations for the support of the Army for the year ending 30th June, 1875, the Quartermaster-General is directed to continue to receive and investigate claims for quartermaster's stores under the act of July 4, 1864, and acts amendatory thereof, and to report them as heretofore, in order that the Secretary of the Treasury may report those recommended for allowance to the Speaker of the House of Representatives at the commencement of each session of Congress.

The legislative, executive, and judicial appropriation act of June 30, 1874, directed all unexpended balances of appropriations, which have remained on the books of the Treasury for more than two fiscal years, to be carried to the surplus fund and covered into the Treasury. The operation of this law concluded the payment by the Treasury of claims and debts of the United States incurred more than two years before the time of proof and acknowledgment.

There were in this Office, unsettled, on 1st July, 1873, 11,347 claims under the act of 4th July, 1864, amounting, as claimed, to $7,822,829.55. There were filed during the year 2,606 for $3,144,572.34. Total, 13,953, for $10,967,401.89. Of these 881, claiming $1,032,484.88, have been reported, recommending allowance of $495,234.38, a reduction of $537,280.47; 528, claiming the sum of $694,152.19, have been reported unfavorably. Thus 1,409 claims have been disposed of, amounting, as presented, to $1,726,637.04, and there remained at the end of the year 12,544 claims for $9,240,764.85.

CLAIMS AND ACCOUNTS CONNECTED WITH THE SERVICE OF TRANSPORTATION OF THE ARMY.

Two hundred and twelve accounts for transportation, amounting to $613,393.72, were on file on 1st July, 1873. Eight hundred and eighty-five accounts, for $767,876.32, and 448 claims for $897,008.80, were filed

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during the year. Total, 1,545, for $2,278,278.84. Of these 1,310 have been disposed of; their amount is $1,664,952.75. Ninety-five, amounting to $400,016.19, were rejected. Seventy-five, amounting to $117,935.41, were suspended. The remainder were either reported for settlement or transferred to other Departments to which they properly pertained. There remained on 30th June, 1874, 235 accounts and claims for transportation, amounting to $613,326.11.

MISCELLANEOUS CLAIMS AND ACCOUNTS.

Fourteen thousand and forty six claims, amounting to $7,475,120.87, were on file at beginning of fiscal year; 12,246 were received during the year, amounting to $1,745,024.29. Total, 26,292 claims and accounts, for $9,220.145.16.

Five thousand and forty claims were approved for $738,950.73, being a reduction in the amount as presented of $269,916.37; 540, amounting to $271,992.79, were rejected; 53, amounting to $5,703.25, were referred to other Departments to which they pertained; 6,180 accounts were approved for $442,966.93, being a reduction in the accounts as presented of $4,682.01; 35 accounts were rejected, amounting to $7,935.42; total disposed of, 11,848 accounts and claims, amounting, as presented, to $1,742,147.50. Thirteen thousand five hundred and ninety-seven miscellaneous claims and 847 accounts remain on file, amounting to $7,477,997.66.

During the winter of 1873 I visited the transportation-routes across the continent, and extended my inspection to the waters of the Lower Columbia and Puget Sound. I visited the island of San Juan and Port Townsend and Victoria on the Straits of Fuca.

A severe cold sealed up the Upper Columbia as I arrived in that river, which closed all travel and transportation above the Cascades, so that I was unable to go higher than the foot of the Cascades, which I reached in the last boat of the season.

The reports of the two officers on duty in this Office, Maj. J. D. Bingham and Maj. M. I. Ludington, with many tables and statements relating to the business of the Department, and also the report of Capt. A. J. McGonnigle, who has been in charge of the business of maintenance and care of the national military cemeteries, accompany this report.

The supplies which it is the duty of this Department to provide and deliver to the Army have been promptly procured, in ample quantity and of good quality, and, under the contract system, with great economy.

Respectfully submitted,

M. C. MEIGS,
Quartermaster-General, Brevet Major-General, U. S. Army.

Hon. W. W. BELKNAP,
Secretary of War.

List of papers accompanying the annual report of the Quartermaster-General for the fiscal year ending June 30, 1874.

I. Report of Maj. J. D. Bingham, quartermaster, United States Army, of the inspection branch of the Quartermaster-General's Office, during the fiscal year ending June 30, 1874.

A.—Report of officers on duty in the Quartermaster's Department during the fiscal year.

B.—List of line officers on duty as acting assistant quartermasters, and of the stations at which they have served during the fiscal year.

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C.—Report of the stations and duties of officers of the Quartermaster's Department July 1, 1874.

II.—Report of Maj. J. D. Bingham, quartermaster, United States Army, of the finance branch of the Quartermaster-General's Office during the fiscal year ending June 30, 1874.

III.—Report of Maj. J. D. Bingham, quartermaster, United States Army, of the operations of the accounts branch of the Quartermaster-General's Office during the fiscal year ending June 30, 1874.

IV.—Report of Maj. J. D. Bingham, quartermaster, United States Army, of the operations of the clothing branch of the Quartermaster-General's Office during the fiscal year ending June 30, 1874.

A.—Statement of articles of clothing, camp and garrison equipage, and materials purchased and manufactured during the fiscal year.

B.—Statement of expenditures on account of clothing and equipage during the fiscal year.

C.—Statement of expenditures on account of preservation of clothing, equipage, and materials from moth and mildew during the fiscal year.

D.—Statement of amounts received from the sale of surplus serviceable, unserviceable, damaged, and irregular articles of clothing, &c., sold at the principal clothing depots, also of the amounts derived from sales to officers, during the fiscal year.

E.—Statement showing, as far as can be ascertained from the records of the Quartermaster-General's Office, the quantities of old-pattern clothing sold under the act of March 3, 1873, at the various depots and posts, also the amount realized from said sales, during the fiscal year.

F.—Statement of the amounts received and expended on account of clothing, camp and garrison equipage, during the fiscal year.

G.—Statement showing quantity of clothing, camp and garrison equipage manufactured, purchased, issued, sold, lost, &c., during the fiscal year, and quantity remaining on hand for the supply of the Army on June 30, 1874.

H.—Statement showing quantity of clothing issued to the destitute poor of the District of Columbia under act of April 20, 1871, during the fiscal year; also aggregate value of clothing issued under said act since the date of its passage.

I.—Statement of number of claims received and acted upon on account of clothing and equipage, during the fiscal year.

K.—Statement of returns of clothing, camp and garrison equipage, received, examined, and transmitted to the Treasury Department, and of letters received and written, during the fiscal year.

V. Report of Maj. M. I. Ludington, Quartermaster United States Army, of the operations of the regular supplies, transportation, and barracks and quarters branches of the Quartermaster-General's Office, during the fiscal year ending June 30, 1874.

A.—Statement of the indebtedness of southern railroad companies for railway material, for the fiscal year.

B.—Extract copy of report of Capt. G. F. Price, Fifth United States Cavalry, in charge of construction of military telegraph in Arizona.

C.—Extract copy of report of Mr. R. R. Haines, superintendent of construction of military telegraph in Arizona.

D.—Statement of troops and stores transported during the fiscal year.

E.—Abstract of contracts for wagon-transportation received at the Quartermaster-General's Office during the fiscal year.

F.—Abstract of contracts for water-transportation entered into by the Quartermaster's Department during the fiscal year.

G.—Statement of vessels chartered and employed during the fiscal year.

H.—Statement of vessels owned or purchased by the Quartermaster's Department during the fiscal year.

I.—General Orders No. 107, War Department, Adjutant-General's Office, Washington, September 1, 1874.

VI.—Report of Capt. A. J. McGonnigle, assistant quartermaster, United States Army, of the operations of the cemeterial branch of the Quartermaster-General's Office during the fiscal year ending June 30, 1874.

A.—Statement of disbursements on account of national cemeteries during the fiscal year.

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I.—*Report of Maj. J. D. Bingham, quartermaster, U. S. A.*

WAR DEPARTMENT, QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., September 16, 1874.

GENERAL: I have the honor to submit a report of the operations of the inspection branch of this Office during the fiscal year ended June 30, 1874.

The duties of this branch continue as specified in previous annual reports, and are principally as follows:

Keeping narrative reports of stations and duties of all officers who perform duty in the Quartermaster's Department.

Examining and preparing, for such action as may be requisite, proceedings of boards of survey, inventory and inspection reports, communications on assignments of officers and distribution of employés, and annual reports of officers.

Filing and distribution of orders, circulars, rolls of honor, and other printed documents.

Preparing monthly returns of officers of the Quartermaster's Department for the Adjutant-General's Office.

Keeping books of "letters received" and "letters sent" relating individually to officers, agents, and employés of the Department.

The following is an approximate statement of the number of orders, circulars, and books received and distributed during the fiscal year:

	Received.	Distributed.
General Orders, Quartermaster-General's Office	.....	2,000
General Orders, Adjutant-General's Office	70,700	57,132
General Court-martial Orders, Adjutant-General's Office	48,000	35,000
General Orders, Headquarters of the Army	700	400
Circulars	90,160	60,000
Roll of honor	.....	1,200
Regulations of the Quartermaster's Department	.....	50
Miscellaneous books and pamphlets	3,594	2,396

During the same period about 1,100 inventory and inspection reports and 98 proceedings of boards of survey have been examined, and, when necessary, acted upon; 4,676 entries have been made in the book of "letters received" and 583 letters written and indorsements made, which are recorded in the corresponding book of "letters sent," be sides a much larger number recorded in books kept in other branches of the Office.

Up to January 31, 1874, the force in this branch consisted of six clerks and one messenger; one clerk and the messenger were on that date discharged under the operations of General Orders No. 1, Adjutant-General's Office, January 2, 1874, for reduction of Quartermaster's employés, leaving the clerical force at five to the end of fiscal year.

I respectfully inclose herewith lists of officers on duty in the Quartermaster's Department during the fiscal year.

Very respectfully, your obedient servant,

J. D. BINGHAM,
Bvt. Brig. General and Quartermaster U. S. A.

The QUARTERMASTER-GENERAL U. S. A.

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No.	Name and grade.	Rank.	Duties, &c.
	QUARTERMASTER-GENERAL.		
1	Montgomery C. Meigs	Brigadier-general and brevet major-general	In charge of Quartermaster's Department at Washington, D. C.; from October 25, 1873, to January 19, 1874, absent on inspection tour, Departments of California and Columbia, &c.
	ASSISTANT QUARTERMASTERS-GENERAL.		
1	Robert Allen	Colonel and brevet major-general	Chief quartermaster Military Division of the Pacific, San Francisco, Cal.
2	Daniel H. Rucker	Colonel and brevet major-general	Chief quartermaster Military Division of the Missouri, and in charge of depot at Chicago, Ill.
3	Rufus Ingalls	Colonel and brevet major-general	Under orders to proceed to Europe under special instructions, and absent accordingly from July 26, 1873, to January 28, 1874; from February 1, 1874, to June 30, 1874, chief quartermaster Military Division of the Atlantic, at New York City.
4	Langdon C. Easton	Colonel and brevet major-general	In charge of Philadelphia depot of the Quartermaster's Department.
5	Stewart Van Vliet	Colonel and brevet major-general	Chief quartermaster Department of the Missouri, at Fort Leavenworth, Kans.
	DEPUTY QUARTERMASTERS-GENERAL.		
1	Samuel B. Holabird	Lieutenant-colonel and brevet brigadier-general.	Chief quartermaster Department of Texas, at San Antonio, Tex.
2	Robert O. Tyler	Lieutenant-colonel and brevet major-general	To February 4, 1874, chief quartermaster Military Division of the Atlantic, and depot quartermaster at New York City; to October 31, 1873, chief quartermaster Department of the East; from September 11, to October 31, 1873, chief quartermaster first quartermaster's district, Department of the East; and thenceforward to February 4, 1874, chief quartermaster first quartermaster's district, Military Division of the Atlantic; from June 8 to June 30, 1874, chief quartermaster second quartermaster's district Military Division of the Atlantic, at Boston, Mass.
3	Charles H. Tompkins	Lieutenant-colonel and brevet brigadier-general.	To January 11, 1874, under suspension; thenceforward awaiting orders.
4	James A. Ekin	Lieutenant-colonel and brevet brigadier-general.	Chief quartermaster Military Division of the South and Department of the South, at Louisville, Ky.; also in charge of depot at Jeffersonville.
5	Frederick Myers	Lieutenant-colonel and brevet brigadier-general.	Chief quartermaster District of New Mexico, at Santa Fé.
6	Alexander Montgomery	Lieutenant-colonel	Chief quartermaster second quartermaster's district, Department of the East, at Boston, to September 30, 1873, thenceforward settling accounts and awaiting action upon application for retirement. Retired January 15, 1874.
7	Tredwell Moore	Lieutenant-colonel and brevet brigadier-general	To April 3, 1874, at Fort Adams, R. I.; thenceforward on sick-leave and settling accounts.
8	Hyatt C. Ransom	Lieutenant-colonel	Chief quartermaster Department of the Gulf, at New Orleans and Holly Springs to August 30, 1873; thenceforward settling accounts, on sick-leave, &c., to March 16, 1874, when he died.
9	Asher R. Eddy	Lieutenant-colonel and brevet colonel	Chief quartermaster Department of California, at San Francisco.
10	Rufus Saxton	Lieutenant-colonel and brevet brigadier-general	Chief quartermaster Department of the Lakes, at Detroit, to October 31, 1873; chief quartermaster fourth quartermaster's district, Military Division of the Atlantic; November 1, 1873, to March 19, 1874, at Detroit, and to June 30, 1874, at Buffalo.

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	QUARTERMASTERS.		
1	Judson D. Bingham	Major and brevet brigadier-general	On duty in the Quartermaster-General's Office.
2	Alexander J. Perry	Major and brevet brigadier-general	Chief quartermaster Department of the Platte, Omaha.
3	Henry C. Hodges	Major and brevet lieutenant-colonel	Post quartermaster at Atlanta to September 30; chief quartermaster Department of the Gulf, at Holly Springs, October 8 to November 10, 1873, and at New Orleans thenceforward to June 30, 1874.
4	John G. Chandler	Major and brevet colonel	In charge of depot at Fort Leavenworth to March 6, 1874; transferring, *en route*, &c., to May 11, 1874, when he assumed duties as chief quartermaster Department of Arizona, at Prescott, so remaining to June 30, 1874.
5	Charles G. Sawtelle	Major and brevet brigadier-general	Chief quartermaster third quartermaster's district, Department of the East and Military Division of the Atlantic, and assistant depot quartermaster at Philadelphia.
6	James J. Dana	Major and brevet brigadier-general	Chief quartermaster Department of Arizona, at Prescott, to December 4, 1873; and in charge of Whipple depot to September 30, 1873; settling accounts at Washington February 5 to 24, 1874; from March 4 to June 30, 1874, depot quartermaster at Fort Leavenworth.
7	Joseph A. Potter	Major and brevet brigadier-general	On sick-leave, &c., to September 30, 1873; post and cemeterial duties at Nashville, October 1, 1873, to April 3–16, 1874; on sick-leave from May 4 to June 30, 1874.
8	Richard N. Batchelder	Major and brevet colonel	Chief quartermaster Department of the Columbia, at Portland, Oreg.
9	Marshall I. Ludington	Major and brevet lieutenant-colonel	On duty in the Quartermaster-General's Office, Washington, D. C.
10	James M. Moore	Major and brevet lieutenant-colonel	Depot quartermaster at Cheyenne.
11	James Belger	Major	Post quartermaster at Fort Brown to January 31, 1874; from March 6 to June 30, 1874, post quartermaster at Baton Rouge.
12	William Myers	Major and brevet brigadier-general	In charge of depot at Washington, D. C.
13	Herbert M. Enos	Major and brevet colonel	Sick at Waukesha, Wis.
14	Benjamin C. Card	Major and brevet brigadier-general	Chief quartermater Department Dakota, at Saint Paul.
	ASSISTANT QUARTERMASTERS.		
1	Charles A. Reynolds	Captain and brevet lietenant-colonel	Post quartermaster at Camp Supply, Indian Territory.
2	George B. Dandy	Captain and brevet brigadier-general	Post quartermaster at Fort Abraham Lincoln from July 15, 1873, to June 30, 1874.
3	George H. Weeks	Captain and brevet lieutenant-colonel	In charge of depot at Buffalo to March 30, 1874; also chief quartermaster fifth quartermaster's district, Military Division of the Atlantic, from November 1, 1873, to March 30, 1874; from March 31 to June 30, 1874, depot quartermaster at Baltimore.
4	Elias B. Carling	Captain and brevet lieutenant-colonel	In charge of forwarding depot at Sargent, Kans., to July 24, 1873; at Granada, Colo., January 15–20, 1874; post quartermaster at Camp Douglas, Utah, from February 1 to June 30, 1874.
5	William B. Hughes	Captain	Assistant to depot quartermaster at San Francisco to February 28, 1874; closing business, *en route*, &c., to May 20, 1874; from May 21 in charge of Yuma depot.
6	Augustus G. Robinson	Captain and brevet major	Post quartermaster at Fort Sill, Indian Territory.
7	Edward D. Baker	Captain	Chief quartermaster Yellowstone expedition, and closing up business connected therewith to October 17, 1873; on leave and settling accounts to February 9, 1874; awaiting orders and *en route* to March 21, 1874; in charge of forwarding depot at Ogden thenceforward to June 30, 1874.
8	Henry W. Janes	Captain and brevet lieutenant-colonel	In charge of depot at Fort Vancouver.
9	James G. C. Lee	Captain and brevet lieutenant-colonel	Jeffersonville, Ind., to March 20, 1874; from April 18 to June 15, 1874, depot and post quartermaster at Charleston, S. C.; from June 15 to 30, 1874, post quartermaster at Charleston.

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A.—*Annual report of officers of the Quartermaster's Department for the fiscayear ending June* 30, 1874—Continued:

No.	Name and grade.	Rank.	Duties, &c.
10	James Gillias	Captain	Purchasing and disbursing quartermaster at Chicago.
11	Theodore J. Eckerson	Captain and brevet major	Post quartermaster at Fort Monroe, Va.
12	Andrew J. McGonnigle	Captain and brevet colonel	On duty in the Quartermaster-General's Office, at Washington, D. C.
13	Edward B. Grimes	Captain and brevet major	In charge of depot at Saint Louis.
14	James W. Scully	Captain and brevet colonel	Post quartermaster at Fort Rice, Dak.
15	William T. Howell	Captain and brevet major	Post quartermaster, closing business and special duties at Camp Douglas, Utah, to January 9, 1874; from January 19 to June 25, in charge of forwarding depot at Granada, Col., and thenceforward to June 30, on the same duty at West Las Animas, Col.
16	Charles W. Foster	Captain and brevet colonel	In charge of depot at Yankton, Dak., to November 10, 1873; thenceforward on same duty at Sioux City, Iowa.
17	George W. Bradley	Captain	In charge of depot at Charleston, S. C., to April 18, 1874; from May 16 to June 30, depot and shipping quartermaster at Bismarck, Dak.
18	Simon F. Barstow	Captain and brevet lieutenant-colonel	Post quartermaster at Raleigh, N. C.
19	John H. Belcher	Captain and brevet major	In charge of depot at Omaha.
20	Ezra B. Kirk	Captain	Post quartermaster at Fort Dodge, Kans.
21	Amos S. Kimball	Captain and lieutenant-colonel	Post quartermaster at Fort Riley, Kans., to December 20–28, 1873; post quartermaster at Fort Brown from February 1 to June 30, 1874.
22	Almon F. Rockwell	Captain and brevet lieutenant-colonel	In charge of Yuma depot, Ariz., to May 21, 1874; thenceforward completing transfer and *en route* to Washington from December 16, 1873, to January 23, 1874; also acting chief quartermaster Department of Arizona, at Prescott.
23	Gilbert C. Smith	Captain	From July 5, 1873, to June 30, 1874, depot and post quartermaster at Fort Union, N. Mex.
24	Thomas B. Hunt	Captain and brevet lieutenant-colonel	Post quartermaster at Fort Seward to January 25, 1874; on trial, &c., to February 26, 1874, when cashiered.
25	Edward J. Strang	Captain and brevet lieutenant-colonel	In charge of forwarding depot at Denison, Tex.
26	Nathaniel S. Constable	Captain	Post quartermaster at Fort Concho, Tex.
27	John B. Furey	Captain	Depot and disbursing quartermaster at Tucson, and post quartermaster at Camp Lowell (new) to February 12, 1874; post quartermaster at Fort Adams, R. I., from April 3 to June 30, 1874.
[28	Lewis Cass Forsyth	Captain and brevet major	Post quartermaster at Fort Ellis and chief quartermaster district of Montana.
29	Charles H. Hoyt	Captain	On duty as chief quartermaster of the Modoc expedition, and settling indebtedness thereof to August 18, 1873; on various special duties, *en route*, &c., to October 10, 1873; disbursing officer at Fort Walla-Walla, Wash., October 10, 1873, to June 10, 1874; thenceforward on leave of absence.
30	Asa P. Blunt	Captain	On sick-leave, awaiting orders, &c., to October 9, 1873, when he assumed duties as chief quartermaster second quartermasters' district, Department of the East, at Boston; from November 1, 1873, to June 9, 1874, at the same place, as chief quartermaster second quartermaster's district, Military Division of the Atlantic; thenceforward transferring and *en route*.
	MILITARY STORE-KEEPERS.		
1	Reuben M. Potter	Captain	On sick-leave, &c., to September 25; thenceforward on duty as acting assistant quartermaster at Fort Wood, New York Harbor.

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2	Charles A. Alligood	Captain	On leave of absence to September 23, 1873; thenceforward on duty as acting assistant quartermaster at Columbia, S. C.
3	John F. Rodgers	Captain	In charge of clothing and equipage at the Philadelphia depot of the Quartermaster's Department.
4	Gustavus A. Hull	Captain	Acting assistant quartermaster at Ogden, Utah, to March 23, 1874; from April 8 to June 30, 1874, on duty at the Philadelphia depot of the Quartermaster's Department.
5	John Livers	Captain	On duty at Fort Leavenworth, Kans.
6	Hamilton Lieber	Captain	On duty at Fort Snelling, Minn., to November 5, 1873; thenceforward on sick-leave.
7	Verplanck Van Antwerp	Captain	On duty as acting depot quartermaster at Baltimore, Md., July 1 to 18, 1873, and September 16, 1873, to March 9, 1874; thenceforward on sick-leave.
8	Addison Barrett	Captain	On duty at Jeffersonville, Ind., as military store-keeper and acting assistant quartermaster.
9	William P. Martin	Captain	On duty as military store-keeper and acting assistant quartermaster at Yerba Buena Island from July 1, 1873, to September 1–30, 1873; thenceforward on same duties at San Francisco.

RECAPITULATION.

Grade.	In service at commencement of fiscal year.	Cashiered.	Retired.	Died.	In service at end of fiscal year.
Quartermaster-General, with rank of brigadier-general	1	.....	.....	.....	1
Assistant quartermasters-general, with rank of colonel	5	.....	.....	.....	5
Deputy quartermasters-general, with rank of lieutenant-colonel	10	.....	1	1	8
Quartermasters, with rank of major	14	.....	.....	.....	14
Assistant quartermasters, with rank of captain	30	1	.....	.....	29
Military store-keepers, with rank of captain	9	.....	.....	.....	9
Total	69	1	1	1	66

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B.—*List of officers on duty as acting assistant quartermasters, and of the stations at whic they have served, during the fiscal year ending June* 30, 1874.

Names.	Lineal rank and regiment.	Brevet rank.	Stations.	Time during year on duty as A. A. Q. M.
Abbott, L. A	1st lt. & R. Q. M. 6th Cav.		Camp 6th Cav., near Fort Hays, Kans.	July 1 to 14, 1873.
Adams, Emil	Capt. 5th Cav.		Camp on San Carlos, Ariz.	—— to Mar. 23, 1874.
Adams, John Q	1st. lt. 1st Cav.	Captain.	Fort Klamath, Oreg	Sept. 24, 1873, to June 30, 1874.
Aldrich, Bishop	1st. lt. & R. Q. M., 8th Inf.		Ft. D. A. Russell, Wyo.	July 1, 1873, to June 30, 1874.
Allen, William	2d lt. 12th Inf.		Camp Mojave, Ariz	Apr. 6 to June 30, 1874.
Allsworth, Edward	1st. lt. 25th Inf.		Fort Bliss, Tex	July 1, 1873, to June 30, 1874.
Anderson, George S	2d lt. 6th Cav		Fort Lyon, Colo	July 1, 1873, to May 18, 1874.
Anderson, John	2d lt. 18th Inf		Newberry, S. C	Sept. 30, 1873, to June 30, 1874.
Andruss, E. Van A	1st. lt. 1st Art	Captain.	Fort Barancas, Fla	Sept. 15 to Dec. 7, 1873.
Arthur, William	1st lt., R. Q. M. 3d Art.	Major	Fort Hamilton, New York Harbor.	July 1, 1873, to June 30, 1874.
Atwood, E. B	1st lt. 6th Inf	do	Fort Stevenson, Dak	July 1 to Oct. 31, 1873.
Do	do	do	Escort for the northern boundary survey commission.	June 13 to 30, 1874.
Austin, Albert	2d lt. 14th Inf		Fort Laramie, Wyo	Nov. 15 to Dec. 7, 1873.
Babbitt, L. S	Captain Ord		Saint Louis Arsenal, Mo	Nov. 14 to Dec. 31, 1873.
Babcock, J. B	1st lt. 5th Cav.	Major	Camp on San Carlos, Ariz.	Mar. 23 to June 30, 1874.
Bacon, George E	2d lt. 16th Inf.		Frankfort, Ky	July 1, 1873, to June 30, 1874.
Baker, Frank	2d lt. 13th Inf.		Fort Fred. Steele, Wyo.	Mar. 1 to June 30, 1874.
Baldwin, J. H	1st lt. R. Q. M. 18th Inf.		Columbia, S. C	July 1 to Aug. 1, 1873.
Barber, Merritt	1st lt. 16th Inf.	Major	Taylor Barracks, Louisville, Ky.	July 1 to 22, 1873.
Do	do	do	Lancaster, Ky	July 22 to June 30, 1874.
Barnard, P. P	1st lt. 5th Cav.	Captain.	Ehrenberg, Ariz	July 1, 1873, to June 30, 1874.
Barrett, Gregory, jr	1st lt. R. Q. M. 10th Inf.		Fort McKavett, Tex	Do.
Bascom, G. M	1st. lt. R. Q. M. 13th Inf.	Major	Fort Fred. Steele, Wyo.	July 1, 1873, to Mar. 1 1874.
Bates, R. F	1st. lt 18th Inf.		Columbia, S. C	Aug. 1 to Sept. 24, 1873.
Beacom, E. S	2d lt. 24th Inf.		Fort McIntosh, Tex	Mar. 2 to June 30, 1874.
Beebe, W. S	1st lt. Ord	Major	Allegheny Arsenal, Pa.	July 1 to Oct. 13, 1873.
Do	do	do	Rock Isl'd Arsenal, Ill.	Oct. 1 to Oct. 31, 1873.
Belger, E. A	1st lt. 3d Inf	do	Camp Supply, Ind. T	Oct. 31 to Nov. 22, 1873.
Bell, James E	1st lt. 1st Art		Fort Jefferson, Fla	July 31 to Sept. 11, 1873.
Bell, James M	1st lt. 7th Cav.	Major	Escort for the northern boundary survey commission.	July 1, 1873, to Nov. 7, 1873.
Bird, Charles	1st. lt. 23d Inf	do	Camp Bowie, Ariz	July 1 to Aug. 19, 1873.
Do	do	do	Whipple Depot, Ariz	Sept. 30, 1873, to June 23, 1874.
Birnie, R, jr	1st lt. 13th Inf		Camp Douglas, Utah	Nov. 7, 1873, to Feb. 1, 1874.
Bishop, J. S	do		Camp Stambaugh, Wyo	July 1 to Oct. 18, 1873.
Bloom, J. E	2d lt. 4th Art		Fort Cape Disappointment, Wash.	Sept. 30, 1873, to Feb. 28, 1874.
Booth, Charles A	2d lt. 1st. Inf		Fort Porter, N. Y	July 20, 1873, to June 30, 1874.
Booth, Charles A	2d lt. 7th Inf		Fort Benton, Mont	Feb. 1 to June 30, 1874.
Boyd, O. B	1st. lt. 8th Cav.		Fort Bayard, N. Mex	July 1, 1873, to June 30, 1874.
Boyle, W. H	1st lt. 21st Inf		Quartermaster in the field in Department of the Columbia.	July 1 to Aug. 30, 1873.
Bradley, J. H	1st. lt. 7th Inf		Fort Benton, Mont	June 30, 1873, to Jan. 31, 1874.
Brant, S. P	2d lt. 21st Inf.		Fort Colville, Wash	Oct. 31, 1873, to June 30, 1874.
Brodrick, P. S	2d lt. 23d Inf.		Board of officers detailed to purchase cavalry horses, Department Arizona.	April 26 to June 30, 1874.
Brown, E. T	2d lt. 5th Art.		Fort Warren, Mass	Dec. 31, 1873, to June 30, 1874.
Bryant, Cullen	1st lt. Ord		Watertown Arsenal, Mass.	Oct. 6, 1873, to June 30, 1874.
Buffington, A. R	Capt. Ord		Indianapolis Arsenal, Ind.	Oct. 15, 1873, to June 30, 1874.
Bubb, John W	1st lt. R. Q. M. 4th Inf.		Fort Bridger, Wyo	July 1, 1873, to June 30, 1874.
Burnham, D. R	2d lt. 15th Inf		Fort Tulerosa, N. Mex.	Do.
Bush, Joseph	Capt. 23d Inf.		Lower Brulé Agency, Dak.	April 7 to May 27, 1874.
Camp, E. M	1st lt. 19th Inf.		Camp Halleck, Nev	Aug. 31, 1873, to June 30, 1874.
Campbell, J. A	2d lt. 3d Art.		Fort Macon, N. C	July 1 to Aug. 31, 1873.
Campbell, W. J	2d lt. 22d Inf.		Fort Laramie, Dak	July 1, 1873, to June 30, 1874.
Capron, T. H	1st lt. 9th Inf.		Camp Canby, Nebr	July 1 to Oct. 24, 1873.
Do	do		United States forces *en route* to North Loup River, Nebr.	Mar 9 to June 30, 1874.
Carter, R. G	2d lt. 4th Cav.		In the field, Department of Texas.	July 1 to 14, 1873.

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B.—*List of officers on duty acting as assistant quartermasters, &c.*—Continued.

Names.	Lineal rank and regiment.	Brevet rank.	Stations.	Time during year on duty as A. A. Q. M.
Cziarc, L. V	1st lt. 2d Art		Fort Johnston, N. C	Aug. 11, 1873, to June 30, 1874.
Clague, John J	1st lt. 12th Inf		Camp Independence, Cal.	Dec. 31, 1873, to June 30, 1874.
Clarke, D. H	2d lt. 15th Inf		Fort Craig, N. Mex	Oct. 31, 1873, to Feb. 28, 1874.
Clark, S. E	2d lt. 2d Inf	Captain.	Mount Vernon Barracks, Ala.	Nov. 30, 1873, to June 30, 1874.
Clarke, W. L	1st lt. 23d Inf		Camp Lowell, Ariz	Feb. 12 to Mar. 4, 1874.
Do	do		Fort Yuma, Cal	Mar. 25 to May 30, 1874.
Clifford, J. C	2d lt. Ord		Benicia Arsenal, Cal	July 1, 1873, to June 30, 1874.
Conrad, C. H	1st lt. 15th Inf		Fort Stanton, N. Mex	Aug. 8, 1873, to Jan. 1, 1874.
Courtney, M. L	1st lt. 25th Inf	Major	Fort Stockton, Tex	July 1, 1873, to June 30, 1874.
Coxe, R. E	2d lt. 8th Cav		In the field, Southern New Mexico.	——, 1873, to Jan. —, 1874.
Craig, Samuel	1st lt. 8th Inf		Beaver, Utah	July 1, 1873, to June 30, 1874.
Craigie, D. J	1st lt. R. Q. M. 12th Inf.	Captain.	Angel Island, Cal	Do.
Crews, H. H	1st lt. 4th Cav		Camp Sabinal, Tex	Mar. 31 to April 16, 1874.
Do	do		Fort Duncan, Tex	April 30 to June 30, 1874.
Crowell, W. H. H	1st lt. 6th Inf		Fort Buford, Dak	Oct. 10, 1873, to May 18, 1874.
Curtis, E. S	2d lt. 2d Art		Fort Johnston, N. C	July 1 to Aug. 11, 1873.
Cushing, H. C	Capt. 4th Art	Major	Sitka, Alaska	July 1 to 10, 1873.
Custer, B. M	1st lt. 24th Inf		Fort McIntosh, Tex	July 1, 1873, to Mar. 2, 1874.
Davidson, F. S	1st lt. 9th Cav		St. Louis Barracks, Mo.	Aug. 31, 1873, to June 30, 1874.
Davies, F L	2d lt. 22d Inf		Lower Brulé Agency, Dak.	July 1, 1873, to June 30, 1874.
Dillenback, J. W	1st lt. 1st Art		Savannah, Ga	July 1, 1873, to June 30, 1874.
Dodge, F. L	1st lt. 23d Inf		Camp Verde, Ariz	July 1 to Nov. 1, 1873.
Do	do		Camp Apache, Ariz	Feb. 1 to May 31, 1874.
Dove, W. E	Capt. 12th Inf		New San Diego, Cal	July 17 to Nov. 18, 1873.
Drury, Thomas	1st lt. 2d Inf		Saint Augustine, Fla	July 1, 1873, to Oct. 26, 1873.
Duff, George	1st lt. 1st Inf		Fort Brady, Mich	Sept. 30, 1873, to June 30, 1874.
Duncan, J. W	2d lt. 21st Inf		Camp San Juan Island, Wash.	Dec. 31, 1873, to June 30, 1874.
Eagan, C. P	1st lt. 12th Inf		Camp Mojave, Ariz	July 24, 1873, to Jan. 1, 1874.
Eastman, J. E	1st lt. 2d Art		Fort Foote, Md	July 1 to 31, 1873.
Ebstein, F. H. E	1st lt. 21st Inf		Camp San Juan Island, Wash.	July 1, 1873, to Jan. 7, 1874.
Edmunds, F. H	2d lt. 1st Inf		Fort Brady, Mich	July 1 to Sept. 1, 1873.
Elderkin, W. A	Capt., com. sub.	Major	Pueblo, Colo	July 1, 1873, to June 30, 1874.
Engle, J. B	1st lt. 15th Inf		Fort Craig, N. Mex	July 1 to Oct. 31, 1873.
Eskridge, R. I	Capt. 23d Inf		Yuma Depot, Ariz	Dec. 5, 1873, to Feb. 6, 1874.
Evans, George W	1st lt. & adjt. 21st Inf.	Captain	Fort Vancouver, Wash.	Sept. 1 to 30, 1873.
Fleming, W. W	1st lt. 12th Inf		Camp Mojave, Ariz	March 5 to April 6, 1874.
Do	do		Camp at La Paz, Ariz	April 24 to June 30, 1874.
Fletcher, R. H	2d lt. 21st Inf		Fort Lapwai, Idaho	July 1, 1873, to June 19, 1874.
Foot, M. C	1st lt. 9th Inf		Sidney Barracks, Nebr.	Feb. 16 to March 14, 1874.
Forse, A. G	1st lt. 1st Cav		Camp McDermit, Nev	July 1, 1873, to June 30, 1874.
Foster, J. E. H	2d lt. 3d Cav		Fort McPherson, Nebr.	June 24 to 30, 1874.
Fountain, S. W	2d lt. 8th Cav		Fort Wingate, N. Mex	July 1, 1873, to May 11, 1874.
Garretty, F. D	1st lt. 17th Inf		Fort Wadsworth, Dak	April 26 to May 10, 1874.
Gibbs, E. B	1st lt. 6th Inf		Saint Paul, Minn	July 1, 1873, to June 30, 1874.
Gifford, J. H	2d lt. 2d Art		Fort Macon, N. C	Aug. 31, 1873, to June 30, 1874.
Godwin, E. A	2d lt. 8th Cav		Fort Selden, N. Mex	July 1, 1873, to June 30, 1874.
Gordon, C. G	1st lt. 6th Cav		Fort Hays, Kans	May 1 to June 30, 1874.
Grealish, M. J	Capt. Ord		Pikesville Arsenal, Md	July 1, 1873, to June 30, 1874.
Greene, B. D	1st lt. Eng		Willett's Point, N. Y	Feb. 14 to June 30, 1874.
Greenough, G. G	1st lt. 4th Art		Point San José, Cal	July 1 to Sept. 30, 1873.
Greer, John E	2d lt. Ord		Augusta Arsenal, Ga	Jan. 1 to June 30, 1874.
Grier, M. C	1st lt. 4th Art		Fort Klamath, Oreg	July 1 to Sept. 3, 1873.
Griffith, D. A	1st lt. 3d Inf		Fort Riley, Kans	April 1 to June 30, 1874.
Grimes, George S	1st lt. 2d Art		Fort Whipple, Va	July 1, 1873, to June 30, 1874.
Gurley, C. L	2d lt. 6th Inf		Fort Stevenson, Dak	Oct. 31, 1873, to June 30, 1874.
Guthrie, J. B	1st lt. 13th Inf		Camp Brown, Wyo	July 1, 1873, to June 30, 1874.
Hall, R. M	1st lt., R. Q. M. 1st Art.	Colonel	Charleston, S. C	July 1, 1873, to May 2, 1874.
Hall, W. P	2d lt. 5th Cav		Camp Grant, Ariz	Oct. 31, 1873, to June 30, 1874.
Halloran, James	1st lt. 12th Inf		Camp Wright, Cal	July 1, 1873, to June 30, 1874.
Hamilton, John	1st lt. 1st Inf		Fort Gratiot, Mich	July 1 to Sept. 30, 1873.
Hamner, W. H	2d lt. 20th Inf		Fort Ripley, Minn	July 1, 1873, to June 30, 1874.
Hawkins, Charles	1st lt. 2d Inf		Mobile, Ala	Aug. 25 to Sept. 1, 1873.
Hart, Daniel	1st lt. 25th Inf	Major	Fort Quitman, Tex	July 1 to Aug. 8, 1873.
Hartz, W. T	1st lt. 15th Inf	do	Fort Garland, Col	July 1, 1873, to June 30, 1874.
Harwood, Paul	1st lt. 20th Inf		Fort Pembina, Dak	Do.
Haskell, H. L	2d lt. 12th Inf		Camp Gaston, Cal	July 1 to Sept. 15, 1873.
Do	do		Fort Yuma, Cal	May 31 to June 30, 1874.
Haskell, J. T	Capt. 23d Inf		Camp Bowie, Ariz	Aug. 20, 1873, to Apr. 13, 1874.
Hathaway, F. H	2d lt., R. Q. M. 5th Inf.	Captain	Fort Leavenworth, Kans.	July 1, 1873, to June 30, 1874.
Hay, Charles	1st lt. 23d Inf		Camp McDowell, Ariz	Do.
Heintzelman, C. S	1st lt. 3d Art		Fort Niagara, N. Y	July 1 to Nov. 23, 1873.

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B.—*List of officers on duty as acting assistant quartermasters, &c.*—Continued.

Names.	Lineal rank and regiment.	Brevet rank.	Stations.	Time during year on duty as A. A. Q. M.
Hennisee, A. G	1st lt. 8th Cav.		Fort Stanton, N. Mex.	July 1 to Aug. 8, 1873.
Do	do		do	Jan. 1 to Mar. 31, 1874.
Hill, R. M	Capt. Ord	Major	Indianapolis Arsenal, Ind.	July 1 to Oct. 15, 1873.
Do	do	do	Augusta Arsenal, Ga.	Oct. 24, 1873, to Dec. 31, 1873.
Hoag, W. R	2d lt. 21st Inf.		Fort Colville, Wash.	July 1 to Oct. 31, 1873.
Hoffman, A. W	1st lt. 10th Inf.		Austin, Tex	July 1, 1873, to Feb. 11, 1874.
Howard, O. H	1st lt. 5th Art.	Major	Fort Trumbull, Conn.	July 1, 1873, to June 30, 1874.
Hoyt, George S	2d lt. 18th Inf.		Atlanta, Ga	Sept. 19, 1873, to Jan. 15, 1874.
Do	do		do	June 20 to 30, 1874.
Hubbell, H. W., jr	2d lt. 1st Art.		Fort Pulaski, Ga	July 1 to Oct. 25, 1873.
Do	2d lt. 1st Art.		Saint Augustine, Fla.	October 26 to June 30, 1874.
Hughes, M. B	1st lt. 9th Cav.		In the field	July 1 to 30, 1873.
Humbert, James	1st lt. 17th Inf		Camp Hancock, Dak.	July 1, 1873, to June 30, 1874.
Humphreys, Charles	1st lt. 3d Art.		David's Island, New York Harbor.	July 11, 1873, to June 30, 1874.
Hurst, J. H	2d lt. 12th Inf	Captain	Camp Beale's Springs, Ariz.	July 1, 1873, to April 30, 1874.
Hyde, John McE	2d lt. 8th Inf.		Camp Stambaugh, Wyo	Oct. 20, 1873, to June 30, 1874.
Ingalls, J. M	1st lt. 1st Art		Fort Jefferson, Fla	July 1 to 31, 1873.
Do	do		do	Oct. 1, 1873, to Jan. 1, 1874.
Do	do		Fort Barrancas, Fla.	March 31 to June 30, 1874.
Ingersoll, Ed	Major and O. S. K.		Springfield Armory, Mass.	July 1, 1873, to June 30, 1874.
Irwin, D. A	1st lt. 1st Cav		Saint Louis Depot, Mo	July 1 to August 31, 1873.
Ives, R. A	2d lt. 5th Art		Fort Preble, Me	June 1 to June 30, 1874.
Jacobs, J. W	1st lt., R. Q. M. 7th Inf.		Fort Shaw, Mont	July 1, 1873, to June 30, 1874.
Jocelyn, S. P	2d lt. 21st Inf		Camp Warner, Oreg	July 1 to September 9, 1873, and March 1 to July 1, 1874.
Johnson, Henry C	2d lt. 1st Inf.		Fort Brady, Mich	Sept. 1 to Sept. 30, 1873.
Johnston, John L	1st lt., R. Q. M. 21st Inf.	Captain	Fort Vancouver, Wash	July 1 to September 1, 1873.
Jones, F. B	1st lt., R. Q. M. 3d Inf.		Fort Hays, Kans	July 1 to October 31, 1873.
Do	do		Fort Riley, Kans	Dec. 20, 1873, to April 1, 1874.
Do	do		Board of officers for the purchase of cavalry horses.	March 25 to June 30, 1874.
Jones, Samuel R	1st lt. 4th Art.		Fort Cape Disappointment, Wash.	March 1 to July 1, 1874.
Keller, Charles	1st lt., R. Q. M. 2d Inf.		Mount Vernon and Mobile, Ala.	Sept. 1 to Nov. 30, 1873.
Do	do		Atlanta, Ga	Dec. 15, 1873, to June 30, 1874.
Kendrick, F. M. H	2d lt. 7th Inf.		Camp Baker, Mont	Sept. 30, 1873, to June 30, 1874.
Keyes, A. S. B	1st lt. 10th Cav	Captain	Fort Sill, Ind. Ter.	Aug. 19 to Nov. 16, 1873.
King, James S	1st lt. 12th Inf		Fort Hall, Idaho	July 1 to December 31, 1873.
Kingsbury, George W	2d lt. 12th Inf		Fort Klamath, Oreg	Sept. 3 to Sept. 24, 1873.
Do	do		Camp Gaston, Cal	Oct. 30, 1873, to June 30, 1874.
Kingsbury, W. E	1st lt. 11th Inf		Fort Griffin, Tex	July 1, 1873, to June 30, 1874.
Knox, Thomas T	2d lt. 1st Cav.		Benicia Barracks, Cal	Do.
Kress, John A	1st lt. Ord	Major	Vancouver Arsenal, Wash.	Do.
Kyle John G	2d lt. 1st Cav.		Camp Bidwell, Cal	July 23, 1873, to June 30, 1874.
Ladley, O. D	2d lt. 22d Inf		Northern Boundary Survey Commission, Department of Dakota.	—— to June 30, 1874.
Lafferty, John	1st lt. 8th Cav.		Summer Camp, 8th Cavalry, on Canadian River, N. Mex.	August 8 to October 31, 1873.
Langdon, L. L	Capt. 1st Art.	Lt. col	Fort Jefferson, Fla	September 11 to Oct. 1, 1873.
Lassiter, William	2d lt. 16th Inf		Colfax, La	June 29 to June 30, 1874.
Lawton, H. W	1st lt., R. Q. M. 4th Cav.		Fort Clark, Tex	July 1, 1873, to June 30, 1874.
Leary, Peter, jr	2d lt. 4th Art.		Fort Cape Disappointment, Wash.	Do.
Leefe, John G	1st lt., R. Q. M. 19th Inf.	Captain	Jackson Barracks, La.	July 1, 1873, to June 18, 1874.
Lemly, Henry R	2d lt. 3d Cav		Sidney Barracks, Nebr	June 18 to June 30, 1874.
Litchfield, H. G	Capt. 2d Art	Lt. col	Omaha, and elsewhere in Department of the Platte, in connection with purchase of horses.	—— to June 30, 1874.
Lord, James H	1st lt., R. Q. M. 2d Art.	Major	Fort McHenry, Md.	July 1, 1873, to June 30, 1874
Do	do	do	Baltimore, Md	July 18 to September 16, 1873, and from Mar. 9 to 31, 1874.

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B.—*List of officers on duty as acting assistant quartermasters, &c.*—Continued.

Name.	Lineal rank and regiment.	Brevet rank.	Stations.	Time during year on duty as A. A. Q. M.
Lord, Thomas W	1st lt., R. Q. M. 20th Inf.	.....	Fort Snelling, Minn...	July 1, 1873, to June 30, 1874.
Love, George M.....	2d lt. 16th Inf .	Lt. col..	Lebanon, Ky.....	Do.
Luff, Edmund	1st lt. 8th Cav .	.....	Summer Camp, 8th Cav., on Canadian River, N. Mex.	July 9 to August 18, 1873.
Do.....	....do	.....	Fort Stanton, N. Mex .	April 1 to June 30, 1874.
MacGowan, A. B	Capt. 12th Inf.	.....	Camp Independence, Cal.	July 1 to December 31, 1873.
Macklin, J. E	2d lt. 22d Inf ..	.....	Fort Sully, Dak	July 1 to August 6, 1873.
Mahon, S. K.....	1st lt. 16th Inf.	.....	Oxford, Miss	July 1 to November 15, 1873.
Maize, W. R	1st lt. 20th Inf.	Captain.	Fort Wadsworth, Dak	July 1 to October 15, 1873.
Manning, W. C.....	1st lt. 23d inf ..	.....	Camp Apache, Ariz ...	July 1 to August 31, 1873.
Marcotte, Henry	1st lt. 17th Inf	Captain.	Newport Barracks, Ky	July 1, 1873, to June 30, 1874.
Markley, A. C.....	1st lt. 24th Inf.	.....	Fort Duncan, Tex.	July 1, 1873, to April 30, 1874.
Marshall, James M ..	1st lt. 4th Art .	.....	West Point, N. Y	July 1, 1873, to June 30, 1874.
McCleave, William ..	Capt. 8th Cav..	.....	Summer Camp, Eighth Cav., at Fort Bascom, N. Mex.	May 19 to June 30, 1874.
McClellan, John	1st lt. 5th Art .	.....	Fort Warren, Mass ...	July 1 to December 31, 1873.
McConhie, Samuel ...	1st lt. 14th Inf.	.....	Sidney Barracks, Nebr	July 1, 1873, to Feb. 16, 1874.
McDermott, George B	2d lt. 23d Inf ..	.....	Fort Yuma, Cal.....	Aug. 9, 1873, to Mar. 31, 1874.
McIntyre, Aug	2d lt. 2d Inf ...	.....	Chattanooga, Tenn	July 1, 1873, to June 30, 1874.
McKee, G. W	1st lt. Ord.....	Major...	St. Louis Arsenal, Mo.	July 1 to November 14, 1873.
McNutt, John	Major Ord	Colonel .	Columbus Arsen'l, Ohio	July 1, 1873, to June 30, 1874.
McTaggart, C. P	1st lt. 17th Inf.	.....	Grand River Agency, Dak.	Do.
Michaelis, O. E.....	1st lt. Ord.....	Captain.	Watertown Arsenal, Mass.	July 1 to October 1, 1873.
Do.....	....do	...do	Allegheny, Arsenal, Pa	Oct. 13, 1873, to June 30, 1874.
Miller, James	1st lt., R. Q. M. 2d Inf.	.....	Mobile, Ala.....	July 1 to August 25, 1873.
Miller, William A....	1st lt. 18th Inf.	.....	Newberry, S. C.....	July 1 to September 30, 1873.
Miltimore, A. E.....	1st lt. 1st Art...	.....	Fort Barrancas, Fla...	Dec. 8, 1873, to March 31, 1874.
Morris, Louis M	1st lt. 20th Inf.	Captain.	Fort Totten, Dak	July 1, 1873, to June 30, 1874.
Morrison, T. W	1st lt. 16th Inf.	.....	Corinth, Miss.....	February 1 to March 12, 1874.
Morton, Alfred	1st lt., R. M. Q. 9th Inf.	.....	Omaha Barracks, Nebr	July 1, 1873, to June 30, 1874.
Mount, John F.....	1st lt. 3d Art ..	Captain.	Fort Wadsworth, N. Y	June 15 to June 30, 1874.
Myer, A. L.....	2d lt. 11th Inf .	.....	Fort Richardson, Tex.	April 2 to June 30, 1874.
Niede, Horace.....	1st lt. 4th Inf..	.....	Fort Sanders, Wyo....	June 23 to June 30, 1874.
Nelson, W. H	1st lt. 7th Inf..	.....	Camp Baker, Mont....	July 1, to September 30, 1873.
Nesmith, L. A	1st lt. 12th Inf.	.....	Camp Halleck, Nev....	July 1 to August 31, 1873.
O'Brien, L. M	1st lt. 17th Inf.	.....	Fort Wadsworth, Dak	Oct. 15, 1873, to April 26, 1874.
Do.....	....do	.....	.....do	May 13 to June 30, 1874.
O'Hara, James.....	1st lt. 3d Art..	.....	Fort Niagara, N. Y ...	Dec. 1, to Dec. 31, 1873.
Do.....	....do	.....	.....do	March 1 to June 30, 1874.
O'Connell, John J	2d lt. 1st Inf ..	.....	Madison Barr'ks, N. Y	July 1, 1873, to June 15, 1874.
Osgood, H. B	1st lt. 3d Art..	.....	Fort Ontario, N. Y	July 1, 1873, to June 30, 1874.
Paddock, George H ..	2d lt. 4th Art..	.....	Sitka, Alaska	Jan. 1 to June 30, 1874.
Parnell, W. R.....	1st lt. 1st Cav .	Major...	Camp Harney, Oreg...	Sept. 30, 1873, to June 30, 1874.
Paul, C. R.....	1st lt. 18th Inf.	Captain	Sumter, S. C	July 1 to Aug. 19, 1873.
Payson, A. H	1st lt. Eng	.....	Willett's Point, N. Y..	July 1, 1873, to Feb. 14, 1874.
Penney, C. G.....	1st lt. 6th Inf..	Captain.	Fort Buford, Dak	July 1 to Oct. 10, 1873.
Do.....	....do	...do	...do	May 18 to June 30, 1874.
Phipps, F. H.....	1st lt. Ord.....	...do	Frankford Arsenal, Pa.	Sept. 1, 1873, to June 30, 1874.
Pierce, F. E.....	1st lt. 1st Inf..	.....	Fort Wayne, Mich	Feb. 28 to June 15, 1874.
Pike, A. F	1st lt. 3d Art..	.....	Fort Wood, N. Y.....	July 1 to Aug. 25, 1873.
Pitman, John, jr	1st lt. Ord.....	.....	Watervliet Arsenal, N. Y.	July 1, 1873, to June 30, 1874.
Pollock, Robert	Capt. 21st Inf ..	.....	Camp Warner, Oreg..	Sept. 9, 1873, to Mar. 1, 1874.
Pond, George E	2d lt. 8th Cav .	.....	San Juan Expedition, Camp Loma, Colo.	July 1 to Oct. 13, 1873.
Potts, R. D.....	1st lt. 3d Art..	.....	Fort Wadsworth, N. Y.	Apr. 1 to June 15, 1874.
Pratt, E. B.....	2d lt. 23d Inf ..	.....	Camp Apache, Ariz...	Aug. 31, 1873, to Jan. 31, 1874.
Prince, William.....	1st lt. Ord	.....	Frankford Arsenal, Pa.	July 1 to Sept. 1, 1873.
Pullman, J. W	1st lt. 8th Cav .	.....	Fort Union, N. Mex...	July 1 to July 5, 1873.
Quimby, H. B	1st lt. 25th Inf.	.....	Fort Davis, Tex.....	July 1, 1873, to June 30, 1874.
Quinby, Ira	1st lt., R. Q. M. 11th Inf.	.....	Fort Richardson, Tex .	July 1, 1873, to Apr. 2, 1874.
Randall, E. L	1st lt. 5th Inf ..	.....	Fort Larned, Kans	July 1, 1873, to June 30, 1874.
Randolph, B. H	2d lt. 3d Art ..	.....	Fort Niagara, N. Y ..	Dec. 17, 1873, to Mar. 31, 1874.
Raphall, A. W	1st lt. 11th Inf.	.....	San Antonio, Tex	July 1 to Aug. 7, 1873.
Rawolle, W. C	1st lt., R. Q. M. 2d Cav.	.....	Fort Sanders, Wyo....	July 1, 1873, to Mar. 28, 1874.
Ray, P. H.....	2d lt. 8th Inf ..	....	Red Cloud agency, afterward Camp Robinson, Nebr.	Mar. 1 to June 30, 1874.
Reed, H. T.....	2d lt. 1st Inf ..	.....	Fort Gratiot, Mich....	Oct. 1, 1873, to June 30, 1874.
Reed, W. I.	1st lt. 7th Inf .	.....	Camp Crook, Mont....	May 14 to ——, 1874.

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B.—*List of officers on duty as acting assistant quartermasters, &c.*—Continued.

Name.	Lineal rank and regiment.	Brevet rank.	Stations.	Time during year on duty as A. A. Q. M.
Rexford, W. H	Capt. O. S. K		Mount Vernon Arsenal, Ala.	July 1 to July 7, 1873.
Rheem, E. B	2d lt. 21st Inf		Fort Vancouver, Wash	Oct. 4, 1873, to May 31, 1874.
Ribbell, C. H	2d lt. 20th Inf		Fort Seward, Dak	Jan. 25 to June 30, 1874.
Rice, W. F	1st lt. 23d Inf		Fort Yuma, Cal	July 1 to July 8, 1873.
Do	do		Camp Apache, Ariz	May 31 to June 30, 1874.
Richards, W. V	1st lt. 16th Inf		Nashville, Tenn	July 1 to Oct. 1, 1873.
Roberts, C. S	1st lt. 17th Inf	Captain	Cheyenne agency, Dak	July 1, 1873, to Mar. 31, 1874.
Robinson, T. B	1st lt. 19th Inf		Fort Wallace, Kans	June 29 to June 30, 1874.
Rockefeller, C. M	2d lt. 9th Inf		Spotted Tail agency, Dak.	June 24 to June 30, 1874.
Rockwell, C. H	1st lt. 5th Cav		Camp Lowell, Ariz	Mar. 3 to June 30, 1874.
Rockwell, James, jr	2d lt. 1st Cav		Benicia Barracks, Cal	July 1 to July 6, 1873.
Roder, John W	1st lt. 4th Art	Major	Point San José, Cal	Do.
Rodgers, C. P	1st lt. 5th Cav		Camp Grant, Ariz	July 1 to Oct. 31, 1873.
Do	do		Camp Bowie, Ariz	Apr. 13 to June 30, 1874.
Rogers, J. S	2d lt. 1st Inf		Fort Wayne, Mich	July 1, 1873, to Feb. 28, 1874.
Rogers, W. W	1st lt. 9th Inf	Captain	Cheyenne Depot, Wyo	July 1, 1873, to June 30, 1874.
Rollins, James H	Capt. Ord		Augusta Arsenal, Ga	July 1 to Nov. 30, 1873.
Romeyn, Henry	1st lt. 5th Inf		Fort Gibson, Ind. T	July 1, 1873, to June 30, 1874.
Rosencrantz, Fred	1st lt. 16th Inf		Little Rock, Ark	Do.
Ross, William J	2d lt. 21st Inf		In the field, Department of Arizona.	Do.
Rucker, L. H	1st lt. 9th Cav		Ringgold Barracks, Tex	Do.
Ruhlen, George	2d lt. 17th Inf		Cheyenne Agency, Dak	April 1 to June 30, 1874.
Russel, A. H	2d lt. 3d Cav		Expedition for exploration west of 100th meridian, in the field.	July 1, 1873, to Jan. 7, 1874.
Rutherford, R. G	1st lt. 12th Inf	Captain	Ft. Columbus, N. Y. H	July 1, 1873, to June 30, 1874.
Sage, George E	2d lt. 5th Art		Ft. Independence, Mass	Do.
Sanborn, W. I	1st lt. 25th Inf		Fort Quitman, Tex	Aug. 8, 1873, to June 30, 1874.
Sands, James H	1st lt. 6th Cav		Camp 6th Cav., near Gunnell, Kans.	Aug. 19 to ——, 1873.
Sarson, H. B	2d lt. 2d Inf		Huntsville, Ala	July 1, 1873, to June 30, 1874.
Sawyer, J. E	1st lt. 5th Art		Plattsburgh Barracks, N. Y.	April 1 to June 30, 1874.
Schwatka, Frederick	2d lt. 3d Cav		North Platte, Nebr	July 1, 1873, to June 30, 1874.
Sellmer, Charles	2d lt. 3d Art	Captain	David's Island, N. Y	July 1 to July 11, 1874.
Shaler, Charles, jr	2d lt. Ord		Rock Island Arsen'l, Ill	Dec. 8, 1873, to March 1, 1874.
Sharp, Thomas	1st lt. 1st Inf		Fort Mackinac, Mich	July 1, 1873, to June 30, 1874.
Shaw, R. G	1st lt. 1st Art		Key West, Fla	Do.
Shelby, I. O	2d lt. 16th Inf		Jackson, Miss	Do.
Sherman, H. P	1st lt. 15th Inf		F't Cummings, N. Mex	July 1 to December 31, 1873.
Do	do		Fort Craig, N. Mex	February 28 to June 30, 1874
Sherman, James L	1st lt. 1st Art		Fort Barrancas, Fla	July 1 to September 15, 1873
Shoemaker, F. L	1st lt. 4th Cav		Camp Sabinal, Tex	July 1, 1873, to March 31, 1874.
Simpson, John	1st lt. 4th Art		Presidio, San Francisco, Cal.	July 1, 1873, to June 30, 1874.
Small, M. P	Capt., com. sub		Prescott, Ariz	January 23 to May 11, 1874.
Smith. A. E	1st lt. 7th Cav	Captain	Yellowstone expedit'n	July 1 to September 30, 1873.
Do	do	do	Black Hills expedition	June 11 to June 30, 1874.
Smith, Frank G	Capt. 4th Art	Major	Fort Cape Disappointment, Wash., and Fort Stevens, Oreg.	July 1 to September 30, 1873.
Smith, Lewis	1st lt. 4th Art		Fort Wadsworth, N. Y.	July 1, 1873, to March 31, 1874.
Smith, Sebree	1st lt. 6th Cav		Camp of 6th Cav., near Fort Hays, Kans.	July 14 to October 18, 1873.
Do	do		Fort Hays, Kans	Nov. 1, 1873, to May 1, 1874.
Spencer, George K	2d lt. 19th Inf		Baton Rouge, La	July 1, 1873, to March 6, 1874.
Spurgin, W. F	1st lt. 21st Inf		Fort Boise, Idaho	July 1, 1873, to June 30, 1874.
Stafford, J. S	1st lt. 20th Inf		Detached duty, Sparta, Wis.	Dec. 16, 1873, to Jan. 21, 1874.
Starr, Irwin M	1st lt. 9th Cav		On duty in connection with purchase of cavalry horses in Dept. Texas.	Aug. 19, 1873, to May 21, 1874.
Stewart, W. F	1st lt. 4th Art		Sitka, Alaska	July 10, 1873, to Jan. 1, 1874.
Stiles, Daniel F	2d lt. 10th Inf		Austin, Tex	February 10 to June 30, 1874.
Stone, E. W	1st lt. 21st Inf	Lt. col	Sub-depot for supplying Modoc expedition at Ashland and Jacksonville, Oreg.	July 1 to August 24, 1873.
Do	do	do	F't Walla-Walla, Wash	May 22 to June 30, 1874.
Sullivan, Thomas C	Capt., com. sub	do	Sioux City, Iowa	July 1 to November 10, 1873.
Tassin, A. G	2d lt. 12th Inf		Camp Gaston, Cal	Sept. 15 to Sept. 30, 1873.
Taylor, A. H. M	2d lt. 19th Inf		Greenwood, La	Dec. 6, 1873, to March 26, 1874.
Taylor, Frank	2d lt. 14th Inf		Fort Fetterman, Wyo	July 1, 1873, to May —, 1874.
Taylor, R. M	1st lt. 20th Inf		Fort Abercrombie, Dak	July 1 to September 13, 1873.
Do	do		Fort Seward, Dak	Dec. 12, 1873, to Jan. 7, 1874.

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B.—*List of officers on duty as acting assistant quartermasters, &c.*—Continued.

Name.	Lineal rank and regiment.	Brevet rank.	Stations.	Time during year on duty as A. A. Q. M.
Theller, E. R.	1st lt. 21st Inf.		Fort Walla-Walla, Wash.	Aug. 12, 1873, to May 22, 1874.
Thies, Frederick	2d lt. 3d Inf.		Fort Lyon, Colo.	May 18 to June 30, 1874.
Thomas, E. D.	1st lt. 5th Art		Camp Hualpai, Ariz.	July 1 to Aug. 26, 1873.
Thompson, E. F.	Capt. 12th Inf.		Camp Mojave, Ariz.	July 1 to Aug. 1, 1873, and Jan. 1 to Mar. 5, 1874.
Thompson, John C.	1st lt. 1st Cav.		Fort McPherson, Nebr.	July 1, 1873, to June 24, 1874.
Thornburgh, T. T.	1st lt. 2d Art.		Fort Foote, Md.	July 1, 1873, to June 30, 1874.
Thorne, P. M.	1st lt. 22d Inf.		Bismarck, Dak.	May 27 to July 13, 1873.
Do	do		Fort Sully, Dak.	Aug. 6, 1873, to June 30, 1874.
Todd, John W.	Major Ord.		Detroit Arsenal, Mich.	July 1, 1873, to June 30, 1874.
Tolman, T. M.	Capt. 1st Inf.		Fort Gratiot, Mich.	Sept. 20 to Oct. 1, 1873.
Tremaine, W. S.	Capt. and Asst. Surg.		Fort Dodge, Kans.	May 10 to May 30, 1874.
Trout, John F.	1st lt. 23d Inf.		Camp Date Creek, Ariz.	July 1 to Sept. 1, 1873.
Do	do		Camp Verde, Ariz.	Nov. 1, 1873, to June 30, 1874.
Trotter, F. E.	Capt. 14th Inf.	Lt. col.	Fort Sanders, Wyo.	Apr. 28 to June 23, 1874.
Troxel, Thomas G.	1st lt. 17th Inf.		Fort Abercrombie, Dak.	Sept. 17, 1873, to June 30, 1874.
Tyler, A. C.	2d lt. 4th Cav.		Camp Sabinal, Tex.	Apr. 17 to June 30, 1874.
Tyler, John	1st lt. 1st Inf.		Fort Porter, N. Y.	July 1 to July 20, 1873.
Varney, A. L.	2d lt. Ord.		Rock Island Arsenal, Ill.	May 31 to June 30, 1874.
Vogdes, A. W.	1st lt. 4th Art.		Fort Fetterman, Wyo.	May 7 to June 30, 1874.
Von Schrader, F.	2d lt. 12th Inf.		Fort Hall, Idaho.	Dec. 31, 1873, to June 30, 1874.
Wallace, Thomas S.	1st lt. 3d Inf.		Fort Wallace, Kans.	July 1, 1873, to June 30, 1874.
Ward, F. K.	2d lt. 1st Cav.		Camp Harney, Oreg.	July 1 to Sept. 30, 1873.
Warrens, C. H.	1st lt. 14th Inf.		Fort Laramie, Wyo.	July 1 to Nov. 15, 1873.
Weeks, H. S.	1st lt. 8th Cav.		Fort Wingate, N. Mex.	May 11 to June 30, 1874.
Weir, G. V.	1st lt. 5th Art.	Captain.	Fort Preble, Me.	July 1, 1873, to June 4, 1874.
Wells, D. T.	1st lt. 8th Inf.	Major.	Spotted Tail Agency, Wyo.	Mar. 17 to May 10, 1874.
Wenie, Thomas M.	2d lt. 19th Inf.		Alexandria, La.	July 1 to Nov. 20, 1873.
Do	do		Colfax, La.	Nov. 21, 1873, to June 29, 1874.
Wheaton, Charles.	Capt. 23d Inf.		Fort Yuma, Cal.	July 8 to Aug. 8, 1873.
Whitall, Samuel R.	2d lt. 16th Inf.		Humboldt, Tenn.	July 1, 1873, to June 30, 1874.
Whitehead, F. F.	1st lt. 18th Inf.	Major.	Yorkville, S. C.	Do.
Whitney, F. A.	1st lt. 8th Inf.		Spotted Tail Agency, Wyo.	May 10 to June 24, 1874.
Whittemore, J. M.	Capt. Ord.		Kennebec Arsenal, Me.	July 1, 1873, to June 30, 1874.
Wieting, O. L.	2d lt. 23d Inf.		Fort Whipple, Ariz.	Do.
Willard, Wells.	1st lt. 5th Inf.	Captain.	Plattsburgh Barracks, N. Y.	July 1, 1873, to April 1, 1874.
Willey, Thomas M.	2d lt. 6th Inf.		Fort Abraham Lincoln, Dak.	July 1 to July 15, 1873.
Williams, William M.	2d lt. 19th Inf.		Saint Martinsville, La.	July 1, 1873, to June 17, 1874.
Do	do		Jackson Barracks, La.	June 17 to June 30, 1874.
Wilson, George S.	2d lt. 12th Inf.		Angel Island, Cal.	Dec. —, 1873, to Jan. —, 1874.
Winchester, H. F.	1st lt. 6th Cav.		Camp, detachment 6th Cavalry, at Wichita, Kans.	July 1 to October 1, 1873.
Winters, W. H.	1st lt. 1st Cav.		Camp Bidwell, Cal.	July 1 to July 31, 1873.
Witherill, C. T.	1st lt. 19th Inf.		Greenwood, La.	July 1 to Dec. 6, 1873.
Wolfe, Nathaniel	2d lt. 2d Art.		Charlotte, N. C.	July 1 to Sept. 30, 1873.
Wolfe, William V.	2d lt. 2d Inf.		Lancaster, Ky.	July 1 to July 22, 1873.
Wood, O. E.	1st lt. 5th Art.		Fort Sullivan, Me.	July 1 to Oct. 8, 1873.
Do	do		Madison Barracks, N. Y.	June 15 to June 30, 1874.
Wright, E. M.	2d lt. Ord.		Rock Island Arsenal, Ill.	July 1 to Sept. 30, 1873; Oct. 31 to Dec. 8, 1873; Mar. 1 to May 31, 1874.
Young, Daniel J.	Capt. O. S. K.		Saint Louis Arsenal, Mo.	Dec. 31, 1873, to June 30, 1874.
Young, Robert H.	2d lt. 4th Art.		Detachment of troops in the field, Department of the Platte.	July 1 to July —, 1873.

C.—*Stations and duties of officers of the Quartermaster's Department, July* 1, 1874.

QUARTERMASTER-GENERAL'S OFFICE.

Meigs, Bvt. Maj. Gen. Montgomery C., Q. M. Gen.; Bingham, Bvt. Brig. Gen. Judson D., Q. M.; Ludington, Bvt. Lieut. Col. Marshall I., Q. M.

GENERAL DEPOTS ESTABLISHED BY GENERAL ORDERS NO. 32, HEADQUARTERS OF THE ARMY, APRIL 8, 1869.

New York.—Ingalls, Bvt. Maj. Gen. Rufus, A. Q. M. Gen., in charge.

Philadelphia depot of the Quartermaster's Department, Pennsylvania.—Easton, Bvt. Maj.

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Gen. Langdon C., A. Q. M., in charge; Rodgers, Capt. John F., military store-keeper; Hall, Capt. Gustavus A., military store-keeper.

Washington, D. C.—Myers, Bvt. Brig. Gen. William, Q. M., in charge, absent at Japan, under orders of the Secretary of War.

Jeffersonville depot of the Quartermaster's Department, Indiana.—Ekin, Bvt. Brig. Gen. James A., D. Q. M. Gen., in charge; Barrett, Capt. Addison, military store-keeper.

Office of national cemeteries, Washington, D. C.—McGonnigle, Bvt. Col. A. J., A. Q. M., in charge.

MILITARY DIVISION OF THE ATLANTIC.

Headquarters, New York City.—Ingalls, Bvt. Maj. Gen. Rufus, A. Q. M. Gen., C. Q. M.; Tyler, Bvt. Maj. Gen. Robert O., D. Q. M. Gen., Boston, Mass.; Saxton, Bvt. Brig. Gen. Rufus, D. Q. M. Gen., Buffalo, N. Y.; Sawtelle, Bvt. Brig. Gen. Charles G., Q. M., New York City; Weeks, Bvt. Lieut. Col. George H., A. Q. M., Baltimore, Md.; Eckerson, Bvt. Major Theodore J., A. Q. M., Fort Monroe, Va.; Furey, Capt. John V., A. Q. M., Fort Adams, R. I.; Potter, Capt. Reuben M., M. S. K., Fort Wood, N. Y.; Van Antwerp, Capt. Verplanck, military store-keeper, on sick leave.

MILITARY DIVISION OF THE SOUTH.

Headquarters, Louisville, Ky.—Ekin, Bvt. Brig. Gen. James A., D. Q. M. Gen., C. Q. M.

Department of the South, headquarters, Louisville, Ky.—Ekin, Bvt. Brig. Gen. James A., Dep. Q. M. Gen., C. Q. M.; Potter, Bvt. Brig. Gen. Joseph A., Q. M., on sick leave; Lee, Bvt. Lieut. Col. James G. C., A. Q. M., Charleston, S. C.; Barstow, Bvt. Lieut. Col. Simon F., A. Q. M., Raleigh, N. C.; Blunt, Bvt. Col. Asa P., A. Q. M., Nashville, Tenn.; Alligood, Capt. Charles A., military store-keeper, Columbia, S. C.

Department of the Gulf: headquarters, Holly Springs, Miss.—Hodges, Bvt. Col. Henry C., Q. M., C. Q. M.; Belger, Maj. James, Q. M., Baton Rouge, La.

MILITARY DIVISION OF THE MISSOURI.

Headquarters, Chicago, Ill.—Rucker, Bvt. Maj. Gen. Daniel H., A. Q. M. Gen., C. Q. M.; Gilliss, Capt. James, A. Q. M., Chicago, Ill.; Grimes, Bvt. Maj. Edward B., A. Q. M., Saint Louis, Mo.

Department of the Missouri: headquarters, Fort Leavenworth, Kansas.—Van Vliet, Bvt. Maj. Gen. Stewart, A. Q. M. Gen., C. Q. M.; Dana, Bvt. Brig. Gen. James J., Q. M., Fort Leavenworth, Kans.; Reynolds, Bvt. Lieut. Col. Charles A., A. Q. M., Camp Supply, Indian Ter.; Howell, Bvt. Maj. William T., A. Q. M., Las Animas, Colo.; Kirk, Captain Ezra B., A. Q. M., Fort Dodge, Kans.; Smith, Capt. G. C., A. Q. M., Fort Union, N. Mex.; Livers, Captain John, military store-keeper, Fort Leavenworth, Kans.

Department of the Platte: headquarters, Omaha, Nebr.—Perry, Bvt. Brig. Gen. A. J., Q. M., C. Q. M.; Moore, Bvt. Lieut. Col. James M., Q. M., Cheyenne Depot, Wyo.; Carling, Bvt. Lieut. Col. Elias B., A. Q. M., Camp Douglas, Utah; Baker, Capt. Edward D., A. Q. M., Ogden, Utah; Belcher, Bvt. Maj. James H., A. Q. M., Omaha, Nebr.

Department of Dakota: headquarters, Saint Paul, Minn.—Card, Bvt. Brig. Gen. Benjamin C., Q. M., C Q. M.; Dandy, Bvt. Brig. Gen. George B., A. Q. M., Fort Abraham Lincoln, Dak.; Scully, Bvt. Col. James W., A. Q. M., Fort Rice, Dak.; Foster, Bvt. Col. Charles W., A. Q. M., Sioux City, Iowa; Bradley, Capt. George W., A. Q. M., Bismarck, Dak.; Forsyth, Bvt. Maj. Lewis C., A. Q. M., Fort Ellis, Mont.

Department of Texas: headquarters, San Antonio, Tex.—Holabird, Bvt. Brig. Gen. Samuel B., D. Q. M. Gen., C. Q. M.; Robinson, Bvt. Maj. A. G., A. Q. M., Fort Sill, Indian Ter.; Kimball, Capt. Amos S., A. Q. M., Fort Brown, Tex.; Strang, Bvt. Lieut. Col. E. J., A. Q. M., Denison, Tex.; Constable, Capt. N. S., A. Q. M., Fort Concho, Tex.

MILITARY DIVISION OF THE PACIFIC.

Headquarters, San Francisco, Cal.—Allen, Bvt. Maj. Gen. Robert, A. Q. M. Gen., C. Q. M.

Department of California: headquarters, San Francisco, Cal.—Eddy, Bvt. Col. Asher R., D. Q. M. Gen., C. Q. M.; Martin, Capt. W. P., military store-keeper, San Francisco, Cal.

Department of Arizona: headquarters, Prescott, Ariz.—Chandler, Bvt. Col. John G., Q. M., C. Q. M.; Hughes, Capt. W. B., A. Q. M., Yuma Depot, Ariz.

Department of the Columbia: headquarters, Portland, Oreg.—Batchelder, Bvt. Col. Richard N., Q. M., C. Q. M.; Janes, Bvt. Lieut. Col. Henry W., A. Q. M., Fort Vancouver, Wash.

MISCELLANEOUS.

Tompkins, Bvt. Brig. Gen. Charles H., D. Q. M. Gen., awaiting orders, San Francisco Cal.; Moore, Bvt. Brig. Gen. Tredwell, D. Q. M. Gen., sick; Enos, Bvt. Col. H. M., Q. M. sick at Waukesha, Wis.; Rockwell, Bvt. Lieut. Col. Almon F., A. Q. M., settling accounts, Washington, D. C.; Hoyt, Capt. Charles H., A. Q. M., on leave of absence; Lieber, Capt. Hamilton, military store-keeper, on sick leave.

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II.—*Report of Maj. J. D. Bingham, Quartermaster, U. S. A.*

WAR DEPARTMENT,
QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., September 3, 1874.

GENERAL: I have the honor to submit a report of the finance branch of this office for the fiscal year ending June 30, 1874.

Part 1 of the following table shows the amounts estimated for by disbursing officers of the Quartermaster's Department upon estimates approved by their commanding officers, under the various heads of appropriations, and part 2 shows the amounts remitted to the same.

The amounts estimated for, and the amounts remitted under the subdivisions of the appropriations for regular supplies, and barracks and quarters, are as follows:

Regular supplies.

	Estimated for.	Remitted.
Fuel	$1,620,367 99	$1,366,154 61
Forage	3,424,365 36	2,645,753 51
Straw	72,651 58	52,685 64
Stationery	125,602 86	94,299 03
Stoves	126,574 03	102,362 94
Total	5,369,561 82	4,261,255 73

Barracks and quarters.

	Estimated for.	Remitted.
Rent of quarters for officers	$299,940 47	$258,635 41
Rent of store-houses, offices, and commutation of quarters for enlisted men	494,411 99	419,569 45
Repairs of barracks, store-houses, &c	843,013 93	552,402 29
New buildings authorized	401,468 66	399,270 66
Total	2,038,835 05	1,629,877 81

The duties performed in this branch have embraced action on estimates of funds, the preparation of requests for remittances to disbursing officers, and action on weekly statements of balances of funds in the hands of disbursing officers.

Very respectfully, your obedient servant,

J. D. BINGHAM,
Bvt. Brig. General and Quartermaster, U. S. Army.

The QUARTERMASTER-GENERAL OF THE ARMY.

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PART 1.—*Amounts estimated for from the appropriations for the fiscal year* 1873-'74.

Military divisions, departments, &c.	Regular supplies.	Incidental expenses.	Cavalry and artillery horses.	Barracks and quarters.	Army transportation.	Clothing and equipage.	National cemeteries.	Hospitals.	Preservation of clothing.	Headstones.	Military telegraph.	Total amount asked.
Department of California	$324,863 72	$110,772 86	$54,834 47	$182,457 44	$465,617 45	$84,729 36	.....	$4,464 72	.....	.....	$50,311 80	$1,278,051 82
Department of Arizona	614,667 69	115,911 54	.....	104,261 80	353,125 30	250 00	.....	.....	.....	.....	.....	1,188,216 33
Department of Columbia	232,537 72	68,096 34	27,616 66	64,979 00	207,170 97	1,000 00	.....	3,578 40	.....	.....	.....	604,979 09
Total Military Division Pacific	1,172,069 13	294,780 74	82,451 13	351,698 24	1,025,913 72	85,979 36	.....	8,043 12	.....	.....	50,311 80	3,071,247 24
Military Division of the Atlantic	273,492 25	92,694 51	1,250 00	121,809 39	102,717 41	6 00	$610 57	18,068 41	.....	.....	.....	610,648 54
Department of the South	148,651 52	81,622 31	2,160 00	99,014 83	105,449 03	178 00	755 50	486 05	.....	.....	.....	438,317 24
Department of the Gulf	67,847 86	62,015 47	.....	62,943 95	112,539 63	82 00	.....	7,732 50	.....	.....	.....	323,161 41
Total Military Division of South	216,499 38	143,637 78	2,160 00	161,958 78	217,988 66	260 00	755 50	8,218 55	.....	.....	.....	761,478 65
Department of the Missouri	856,960 68	244,761 56	64,425 00	110,003 30	399,964 22	865 50	9 00	5,964 02	.....	.....	.....	1,682,953 28
Department of the Platte	743,795 17	315,618 29	51,170 00	222,818 28	368,158 33	805 20	17,675 50	23,669 70	.....	.....	.....	1,843,710 47
Department of Dakota	783,796 06	131,830 78	43,992 00	198,975 09	469,662 33	517 26	42 00	13,396 31	.....	.....	.....	1,642,211 83
Department of Texas	851,012 65	123,145 20	95,055 80	141,603 78	445,772 40	265 00	1,153 00	18,618 18	.....	.....	.....	1,676,626 01
Depot at Chicago	51,780 87	63,287 05	52,092 57	84,664 00	580,580 00	2,300 00	.....	.....	.....	.....	.....	834,704 49
Depot at Saint Louis	43,211 80	28,652 54	.....	31,707 17	233,656 45	27 50	32,235 15	.....	.....	$50 00	.....	369,521 61
Total Military Division Missouri	3,330 557 23	907,295 42	306,735 37	789,771 62	2,497,793 73	4,780 46	51,114 65	61,648 21	.....	50 00	.....	8,049,727 69
Depot at New York	61,192 41	49,883 56	4,160 00	94,968 14	295,456 45	21,789 60	237 50	.....	.....	.....	.....	527,687 66
Depot at Philadelphia	37,019 89	46,226 89	.....	32,316 92	186,327 95	1,597,451 91	.....	.....	$64,817 88	.....	.....	1,974,161 44
Depot at Washington	166,241 54	233,577 84	2,600 00	338,197 80	35,904 50	94 75	34,800 89	.....	.....	.....	.....	811,417 32
Depot at Jeffersonville	37,189 98	36,677 97	.....	6,932 36	93,090 10	27,728 20	3,127 57	.....	.....	.....	.....	204,746 18
Cavalry depot at Saint Louis	4,691 67	10,689 05	.....	10,637 33	.....	.....	.....	4,982 39	.....	.....	.....	26,018 05
Newport Barracks, Ky	211 50	4,319 55	.....	8,887 97	11,362 75	.....	.....	.....	.....	.....	.....	29,764 16

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Fort Columbus, New York Harbor	350 00	2,555 35	.....	1,115 50	555 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,391 31
West Point, N. Y	39,354 50	8,716 50	.....	380 00	175 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48,626 00
Rock Island Arsenal	3,021 40	228 00	.....	.....	1,286 80	.....	.....	.....	50 00	.....	.....	.....	.....	.....	.....	4,586 20
Allegheny Arsenal	3,717 00	767 00	.....	180 00	5,720 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,384 50
Augusta Arsenal	965 29	523 00	.....	.....	2,858 14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,346 43
Watervliet Arsenal	3,350 01	100 00	.....	.....	1,278 82	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,728 83
Columbus Arsenal	996 50	109 50	.....	.....	268 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,374 50
Watertown Arsenal	7,292 81	725 67	.....	.....	9,503 33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17,522 01
Springfield Armory	3,269 74	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,269 74
Pikesville Arsenal	249 19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	249 19
Detroit Arsenal	663 14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	663 14
Kennebec Arsenal	918 42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	918 42
Indianapolis Arsenal	405 85	.....	.....	.....	20 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	425 85
Frankford Arsenal	130 00	229 00	.....	.....	1,200 13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,559 13
Benecia Arsenal	4,457 19	317 35	.....	.....	359 02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,133 56
National cemeteries	1,255 80	73 00	.....	.....	48 80	.....	.....	.....	.....	319 150 12	.....	.....	.....	.....	.....	320,527 72
Grand total	5,369,561 82	1,834,127 88	399,356 50	2,038,835 05	4,489,829 31	1,738,189 48	409,846 80	104,676 94	64,817 88	50 00	50,311 80	16,499,603 46				

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PART 2.—*Amounts remitted from the appropriations for the fiscal year 1873-74.*

Military divisions, departments, &c.	Regular supplies.	Incidental expenses.	Cavalry and artillery horses.	Barracks and quarters.	Army transportation.	Clothing and equipage.	National cemeteries.	Hospitals.	Preservation of clothing.	Headstones.	Military telegraph.	Total amount remitted.
Department of California	$235,370 50	$83,047 86	$54,834 47	$136,924 57	$376,537 45	$81,988 36	.....	$4,464 72	.....	.....	$50,311 80	$1,043,479 73
Department of Arizona	430,987 69	74,120 25	.....	68,975 80	332,140 96	250 00	.....	1,500 00	.....	.....	.....	907,974 70
Department of the Columbia	229,196 57	45,946 04	27,616 66	46,745 00	199,666 97	1,000 00	.....	3,578 40	.....	.....	.....	553,749 64
Total Military Division Pacific	915,554 76	203,114 15	82,451 13	252,645 37	908,345 38	83,238 36	.....	9,543 12	.....	.....	50,311 80	2,505,204 07
Division of the Atlantic	198,030 52	60,462 62	950 00	92,972 40	82,478 41	6 00	$735 57	17,663 41	.....	.....	.....	453,298 93
Department of the South	102,238 66	57,521 83	2,160 00	92,821 36	68,822 86	178 00	924 00	486 05	.....	.....	.....	325,152 76
Department of the Gulf	61,302 72	29,688 74	.....	70,516 41	93,497 00	82 00	240 00	7,732 50	.....	.....	.....	263,059 37
Total Military Division of South	163,541 38	87,210 57	2,160 00	163,337 77	162,319 86	260 00	1,164 00	8,218 55	.....	.....	.....	588,212 13
Department of the Missouri	672,307 02	152,975 32	64,425 00	88,248 56	364,180 26	865 00	900 00	5,964 02	.....	.....	.....	1,348,974 68
Department of the Platte	563,215 39	167,396 76	47,250 00	213,871 97	280,851 02	655 00	7,257 50	16,469 70	.....	.....	.....	1,296,967 34
Department of Dakota	660,802 77	100,398 78	.....	155,910 90	387,354 33	517 26	42 00	13,396 31	.....	.....	.....	1,318,422 35
Department of Texas	710,714 70	82,784 30	95,055 80	134,199 79	385,061 40	265 00	983 00	18,618 18	.....	.....	.....	1,427,682 17
Depot at Chicago	29,186 81	42,276 60	52,092 57	50,903 44	155,635 00	2,300 00	.....	.....	.....	.....	.....	332,394 42
Depot at Saint Louis	36,874 60	24,754 18	.....	28,840 17	148,363 60	27 50	22,843 40	.....	.....	$50 00	.....	261,753 45
Total Military Division Missouri	2,673,101 29	570,585 94	258,823 37	671,974 83	1,721,445 61	4,629 76	31,134 90	54,448 21	.....	50 00	.....	5,986,194 41
Depot at New York	43,338 72	31,098 38	4,160 00	87,278 89	157,755 26	11,263 24	312 50	.....	.....	.....	.....	335,206 99
Depot at Philadelphia	27,415 11	28,997 24	.....	28,887 63	148,094 93	1,415,848 35	.....	.....	$50,000 00	.....	.....	1,699,243 26
Depot at Washington	151,338 34	221,947 06	2,600 00	307,692 78	34,989 50	94 75	26,949 39	.....	.....	.....	.....	745,611 82
Depot at Jeffersonville	23,480 21	24,910 88	.....	6,357 09	81,277 95	23,168 84	1,596 55	.....	.....	.....	.....	160,701 52
Cavalry Depot at Saint Louis	100 00	6,308 35	.....	9,240 58	.....	.....	.....	.....	.....	.....	.....	15,648 93
Newport Barracks, Ky	223 50	4,277 90	.....	7,915 97	8,362 75	.....	.....	4,982 39	.....	.....	.....	25,662 51
Fort Columbus, New York Harbor	307 51	2,409 00	.....	1,070 50	553 49	99 20	.....	3,716 26	.....	.....	.....	8,155 87

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West Point, N. Y.	39,324 50	8,293 20	.....	360 00	175 00	.....	.....	.....	.....	.....	.....	.....	48,062 70
Rock Island Arsenal	2,593 37	223 00	.....	.....	1,031 80	.....	50 00	.....	.....	.....	.....	.....	3,903 17
Allegheny Arsenal	2,538 69	370 00	.....	144 00	5,320 50	.....	.....	.....	.....	.....	.....	.....	8,373 19
Augusta Arsenal	965 20	438 00	.....	.....	2,315 40	.....	.....	.....	.....	.....	.....	.....	3,718 69
Watervliet Arsenal	3,147 04	100 00	.....	.....	1,000 00	.....	.....	.....	.....	.....	.....	.....	4,247 04
Columbus Arsenal	996 50	72 00	.....	.....	306 00	.....	.....	.....	.....	.....	.....	.....	1,374 50
Watertown Arsenal	4,525 00	300 00	.....	.....	4,200 00	.....	.....	.....	.....	.....	.....	.....	9,025 00
Springfield Armory	3,231 52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,231 52
Pikesville Arsenal	246 42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	246 42
Detroit Arsenal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kennebec Arsenal	918 42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	918 42
Indianapolis Arsenal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Frankford Arsenal	130 00	170 00	.....	.....	947 00	.....	.....	.....	.....	.....	.....	.....	1,247 00
Benicia Arsenal	4,457 19	110 80	.....	.....	334 02	.....	.....	.....	.....	.....	.....	.....	4,902 01
National cemeteries	1,840 45	57 00	.....	.....	38 80	.....	210,136 94	.....	.....	.....	.....	.....	212,073 16
Grand total	4,261,255 73	1,251,461 09	351,144 50	1,629,877 81	3,321,291 57	1,538,609 00	371,989 82	98,571 94	50,000 00	50 00	50,311 80	12,824,563 26	

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III.—*Report of Maj. J. D. Bingham, Quartermaster, U. S. A.*

WAR DEPARTMENT,
QUARTERMASTER GENERAL'S OFFICE,
Washington, D. C., September 15, 1874.

GENERAL: I have the honor to submit the following report of operations of the accounts branch of this Office for the last fiscal year:

	Appropriations.					Total.
	Prior to July, 1870.	1870–'71.	1871–'72.	1872–'73.	1873–'74.	
On July 1, 1873, the balances of appropriations of the Quartermaster's Department in the Treasury, undrawn, were, by report of last year	$1,637,886 00	$259,505 40	$1,030,712 12	$421,159 00	.....	$3,349,262 52
Appropriations for the fiscal year	.....	.....	.....	.....	$15,498,820 61	15,498,820 61
Appropriations for deficiencies, (act of June 22, 1874)	.....	.....	.....	565,000 00	.....	565,000 00
Amounts placed to the credit of appropriations during the year by deposits of funds for redistribution, and of amounts received from sales to officers, &c., of public property	186,091 15	146,340 24	92,483 09	512,292 27	183,465 13	1,120,671 88
Amount expended for other departments, and refunded by them during the year	393,924 29	8,975 67	22 857 79	1,173 02	.....	426,930 77
Requests for requisitions issued prior to and canceled within the year	110 00	.....	.....	1,271 47	.....	1,381 47
Amount received from the Ordnance Department for repair of arsenal at Charleston, S. C.	.....	.....	.....	.....	500 00	500 00
Total	2,218,011 44	414,821 31	1,146,053 00	1,500,895 76	15,682,785 74	20,962,567 25
Remitted to disbursing officers during the year on requests of the Quartermaster-General	.....	.....	33,361 89	240,098 90	13,135,452 57	13,408,913 36
Requisitions on settlements made at the Treasury of claims and accounts	1,297,029 92	25,691 11	24,453 96	503,914 75	79,593 73	2,030,683 47
Amount transferred to the Ordnance Department for expenditure in the manufacture of knapsacks, haversacks, canteens, and great-coat straps	.....	.....	20,802 50	.....	.....	20,802 50
Total	1,297,029 92	25,691 11	178,618 35	744,013 65	13,215,046 30	15,460,399 33
Balances in the Treasury July 1, 1874	920,981 52	389,130 20	967,434 65	756,882 11	2,467,739 44	5,502,167 92

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The balances of appropriations undrawn by the Quartermaster's Department July 1, 1874, were as follows:

Appropriations.	For what fiscal years.					Total.
	Prior to July 1, 1870.	1870–'71.	1871–'72.	1872–'73.	1873–'74.	
Regular supplies	$210,405 41	$83,936 73	$91,075 03	$81,163 44	$237,486 45	$704,067 06
Incidental expenses	111,791 61	71,373 85	126,442 66	169,612 74	47,981 57	527,202 43
Purchase of cavalry and artillery horses	28 54	13,594 27	27,983 31	54,544 04	.....	96,150 16
Barracks and quarters	8,093 81	39,203 31	82,576 25	67,716 88	52,862 65	250,452 90
Transportation of the Army	339,128 79	131,684 54	630,702 78	156,797 49	1,124,593 10	2,382,906 70
Transportation of officers' baggage	8,570 32	.....	.....	.....	.....	8,570 32
Clothing of the Army	208,508 22	49,315 90	8,537 10	11,809 15	383 93	278,554 30
Appropriation for stoves	34,454 82	21 60	117 52	.....	.....	34,593 94
National cemeteries	.....	.....	.....	877 02	3,053 18	3,930 20
Hospitals	.....	.....	.....	31,398 69	1,428 06	32,826 75
Expenses of sales	.....	.....	.....	9,180 07	.....	9,180 07
Headstones for soldiers' graves	.....	.....	.....	163,866 25	993,950 00	1,163,816 25
Monument at Salisbury, N. C	.....	.....	.....	10,000 00	.....	10,000 00
Total	920,981 52	389,130 20	967,434 65	756,965 77	2,467,738 94	5,502,251 08

The accounts and vouchers which have been examined in this Office since the last annual report show approved disbursements, as follows:

Appropriations.	For what fiscal years.					Total.
	Prior to July 1, 1870.	1870–'71.	1871–'72.	1872–'73.	1873–'74.	
Regular supplies	$65,884 83	$2,898 31	$94,828 01	$2,377,482 00	$3,456,549 20	$5,997,642 35
Incidental expenses	51,165 97	5,878 52	48,602 18	573,552 38	1,050,418 36	1,729,617 41
Purchase of cavalry and artillery horses	266,650 52	86 72	8,173 74	195,939 30	66,805 23	537,655 51
Barracks and quarters	32,437 62	6,222 98	61,140 95	709,561 10	1,294,818 66	2,104,181 31
Transportation of the Army	88,465 79	13,915 66	206,580 66	3,088,308 63	2,327,005 59	5,724,276 33
Transportation of officers' baggage	635 10	.....	.....	.....	.....	635 10
Clothing of the Army	879 28	47 72	14,315 42	448,661 45	1,078,214 22	1,542,118 09
Stoves	731 09	.....	52 75	205 33	.....	989 17
National cemeteries	1,335 63	550 65	13,452 23	143,868 17	219,680 91	378,887 59
Collecting, organizing, and drilling volunteers	1,304 76	.....	.....	.....	.....	1,304 76
Transportation of insane volunteers	.....	.....	547 68	248 58	78 30	874 56
Hospitals	.....	.....	.....	44,820 87	52,415 17	97,236 04
Expenses of sales	.....	.....	.....	819 93	322 15	1,142 08
Headstones for soldiers' graves	.....	.....	.....	14,165 95	6,772 22	20,938 17
Army contingencies	.....	.....	.....	18 84	346 30	365 14
Fire-proof building at Jeffersonville	.....	.....	.....	4,182 48	.....	4,182 48
Preservation of clothing, &c	.....	.....	.....	135,182 12	50,362 33	185,544 45
Erection of barracks at Jeffersonville	.....	.....	.....	2,333 39	.....	2,333 39
Mojave claims	.....	.....	.....	12,256 00	1,375 00	13,631 00
Construction of military telegraph	.....	.....	.....	.....	19,257 89	19,257 89
Repairing arsenal, Charleston, S. C	.....	.....	.....	.....	135 87	135 87
Total	509,490 59	29,600 56	447,693 62	7,751,606 52	9,624,557 40	18,362,948 69

Attention is invited to the fact that accounts for the last fiscal year ending June 30, 1874, to the amount of $9,624,557.40, had been examined in this Office by the time the year expired. The appropriations for the year amounted to $15,498,820.61.

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The following tables exhibit the number of money-accounts and property returns on hand at the commencement of the fiscal year, the number received during the year, and the number remaining on hand unexamined at the close of the year:

Money-accounts.

	For what calendar year.										Total.
	1861.	1862.	1863.	1865.	1869.	1870.	1871.	1872.	1873.	1874.	
On hand July 1, 1873	.....	.....	.....	.....	.....	.....	.....	627	1,151	.....	1,778
Received during the year	5	13	5	3	1	2	33	5	1,848	1,142	3,057
Total	5	13	5	3	1	2	33	632	2,999	1,142	4,835
Examined during the year	5	13	5	3	1	2	33	632	2,999	664	4,357
On hand, unexamined, July 1, 1874	.....	.....	.....	.....	.....	.....	.....	.....	.....	478	478

Property-returns.

	For what calendar year.								Total
	1862.	1864.	1869.	1870.	1871.	1872.	1873.	1874.	
On hand July 1, 1873	.....	.....	.....	.....	.....	292	885	.....	1,177
Received during the year	9	1	1	2	9	35	2,685	859	3,601
Total	9	1	1	2	9	327	3,570	859	4,778
Examined during the year	9	1	1	2	9	327	3,570	804	4,723
On hand, unexamined, July 1, 1874	.....	.....	.....	.....	.....	.....	.....	55	55

At the end of the fiscal year there were in the files, unexamined, only 478 money-accounts and 55 property-returns.

The accounts pertaining to the Quartermaster's Department, rendered by officers of the Army prior to the 1st of December, 1871, were simple in form, and received but a partial examination in this Office. Neither the accounts with the separate appropriations, nor those of different fiscal years were kept separate. An officer might have in his possession funds pertaining to several fiscal years, yet they were all embraced in one account-current, which was rendered monthly.

The examination made by this Office did not then extend to computations, but was confined principally to matters of form. It was ascertained that amounts were properly carried from one paper to another; that issues were authorized; that articles purchased were accounted for; and, generally, that regulations and orders had been complied with.

To carry out the act of July 12, 1870, General Order No. 68, series of 1871, was issued. The accounts rendered under this order have necessarily been more elaborate in form, and have been thoroughly examined. All calculations have been verified, all payments, purchases, and transfers checked, and separate accounts kept with each officer, under each head of appropriation for each fiscal year.

It is believed that the work of examining money-accounts is now nearly three times as great as it was before.

During the year two hundred and eighty-one settlements have been made of officers' accounts under the act of June 23, 1870. The amount allowed by such settlements is $99,839.91.

The following table exhibits the number of wagons, spring-wagons

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ambulances, harness, &c., on hand at the beginning and end of the fiscal year ending June 30, 1874, and purchased during the year, as shown by the returns of quartermaster's stores received at this Office:

Articles.	On hand July 1, 1874.	Purchased during the year.	Remaining on hand June 30, 1874.
Army-wagons	3,022	309	2,385
Spring-wagons	285	7	259
Ambulances	217	.....	159
Wagon-harness	22,880	149	20,149
Ambulance-harness	2,389	49	1,934

Statement of fuel, forage, and straw issued during the fiscal year ending June 30, 1874, as shown by the returns of quartermasters received at this Office:

Wood, cords	136,047	Barley, bushels	179,283
Anthracite coal, tons	18,110	Bran, bushels	51,078
Bituminous coal, tons	20,211	Fodder, tons	53
Corn, bushels	710,005	Straw, tons	3,206
Oats, bushels	990,497		

The number of clerks employed in the accounts-branch at the date of the last report was as follows: One of class 4, four of class 3, six of class 2, and thirty-eight of class 1; total 49. The number now employed is as follows: Three of class 4, four of class 3, nine of class 2, and nineteen of class 1; total thirty-five.

Respectfully submitted to the Quartermaster-General.

J. D. BINGHAM,
Brt. Brig. Gen. and Quartermaster, U. S. A.

IV.—*Report of Maj. J. D. Bingham, Quartermaster, U. S. A.*

WAR DEPARTMENT,
QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., September 25, 1874.

GENERAL: I have the honor to submit the annual report of the clothing branch of this Office for the fiscal year ending June 30, 1874.

The principal duties connected with this branch of the Office have consisted in supplying the Army of the United States with the necessary clothing, camp and garrison equipage; the manufacture and purchase of such articles as were not on hand and required; the preservation of articles of woolen clothing and materials for manufacture of clothing on hand at the various depots of the Quartermaster's Department, either by repacking or treatment by the moth and mildew-proof process of Messrs. Cowles & Co.; the sale of such articles as had become damaged and unserviceable from long storage; the sale of a large portion of the clothing known as "old-pattern," as required by act of Congress approved March 3, 1873; the examination and settlement of officers' clothing-accounts; the examination of claims for clothing and equipage furnished for use of the United States Army during the late war, not heretofore acted upon or presented to this Office.

By reference to the statement marked A accompanying this report it will be perceived that a year's supply of the new uniform was provided for the whole Army during the late fiscal year.

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According to reports received from officers it appears that the new uniform is much liked, and gives general satisfaction. The new plaited blouse was found, however, to be objectionable, and, upon the recommendation of the Quartermaster-General, the Secretary of War authorized the adoption of a blouse of a different pattern. A saving of about $84,000 per annum by this Department will be made by the adoption of the new-pattern blouse.

During the present fiscal year the tariff of sizes of clothing has, after investigation and consultation with experienced officers of the Quartermaster's Department, been modified, and is now established as follows:

Articles.	1	2	3	4	5	6	7	8	9	10	11	12	
Boots and bootees	....	....	....	....	3	10	30	35	14	4	3	1	100
Helmets and dress-caps	16	28	22	20	10	4	....	....	....	....	....	....	100
Forage-caps	20	30	25	15	7	3	....	....	....	....	....	....	100
Uniform coats and blouses	30	45	20	5	....	....	....	....	....	....	....	....	100
Great-coats	20	40	30	10	....	....	....	....	....	....	....	....	100
Fatigue-frocks	15	45	30	10	....	....	....	....	....	....	....	....	100
Trousers	10	45	30	10	5	....	....	....	....	....	....	....	100
Drawers	15	45	30	10	....	....	....	....	....	....	....	....	100

A larger size of drawers (No. 4) has also been added.

In pursuance of the act of March 3, 1873, and under instructions of the Secretary of War, the greater portion of the articles of clothing known as "old-pattern" was sold at public auction, after public advertisement. A list of the articles sold will be found in statement E of this report. The gross proceeds of these sales were covered into the Treasury of the United States as required by law.

During the next fiscal year it is estimated that $1,883,610.80 will be required for clothing and equipping the Army.

Congress, by act approved June 16, 1874, in making provision for the support of the Army during the present fiscal year, required that none of the money appropriated should be used in the purchase of hats, uniform-caps, forage-caps, uniform-coats, uniform-jackets, flannel sack-coats, and unlined coats, but that these articles should be issued from the supply on hand, known as the old pattern; and that none of the articles above enumerated should be purchased until those on hand were exhausted.

Immediate action was taken to carry the provisions of this act into effect. The greater portion of the articles of old-pattern clothing, available and suitable for use, were on hand at the depot at Jeffersonville, Ind.

Orders for issue were given, but upon examination of the stock it appeared that all the hats and forage caps and covers had, by long storage, become unfit for issue.

They have since been condemned and recommended to be sold at auction. The corresponding articles of the new-pattern uniform are now being purchased for issue.

It was further ascertained that of some of the old-pattern clothing, required to be issued under the above act, certain sizes were exhausted, and the Army is now being supplied partly with new and partly with old-pattern clothing. The only articles of the old pattern uniform which can be furnished, of an entire assortment of sizes, are uniform-jackets for cavalry and light artillery; uniform-coats, ordnance; and sack-coats, unlined. Of the latter, some of the sizes will soon be ex

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hausted. Of infantry-coats, only the small sizes, 1 and 2, are on hand. Of sack-coats, lined, only sizes 2 and 3 can be supplied.

A sufficient quantity of old-pattern clothing of such sizes as are on hand, and which will be needed under the act of June 18, 1874, authorizing the issue of 10,000 suits of clothing to the National Home for Disabled Volunteers, has been ordered to be reserved for that purpose.

During the last fiscal year 44,530 pairs of bootees have been issued to the National Home for Disabled Volunteers, under the act of January 21, 1873, making a total of 184,956 pairs of pegged bootees, 4,500 pairs sewed, and 852 pairs pegged boots issued to that institution under the act referred to.

Sixteen clerks, three copyists, and two laborers have been employed in this branch of the Office during the fiscal year ending June 30, 1874.

For further details of the operations of the clothing branch, I respectfully refer to the statements submitted herewith, viz:

A.—Statement of articles of clothing, equipage, and materials purchased and manufactured during the fiscal year ending June 30, 1874.

B.—Statement of expenditures on account of clothing and equipage during the fiscal year ending June 30, 1874.

C.—Statement of expenditures on account of preservation of clothing, equipage, and materials from moth and mildew, during the fiscal year ending June 30, 1874.

D.—Statement of amounts received from the sale of surplus serviceable, unserviceable, damaged, &c., articles of clothing and equipage sold at the principal clothing depots; also of the amounts derived from sales to officers, during the fiscal year ending June 30, 1874.

E.—Statement showing, as far as can be ascertained from the records of the Quartermaster-General's Office, the quantities of old-pattern clothing sold under the act of March 3, 1873, at the various depots and posts during the fiscal year ending June 30, 1874; also, the amount realized from said sales.

F.—Statement of the amounts received and expended by the Quartermaster's Department on account of clothing, camp and garrison equipage, during the fiscal year ending June 30, 1874.

G.—Statement showing, as far as can be ascertained from the records of this Office, the quantity of clothing, camp and garrison equipage, and clothing-materials in the hands of the officers of the Army June 30, 1873; the quantity of clothing and equipage purchased, manufactured, sold, lost, and issued to the Army of the United States during the fiscal year ending June 30, 1874, and the quantity remaining on hand for the supply of the Army at that date.

H.—Statement showing quantity of clothing issued to the destitute poor of the District of Columbia, under act of April 20, 1871, during the fiscal year ending June 30, 1874; also aggregate value of clothing issued under said act since the date of its passage.

I.—Statement of number of claims received and acted upon during the fiscal year ending June 30, 1874, on account of clothing and equipage.

K.—Statement of returns of clothing, camp and garrison equipage received, examined, and transmitted to the Treasury Department, and of letters received and written during the fiscal year ending June 30, 1874.

Very respectfully, your obedient servant,

J. D. BINGHAM.
Quartermaster, Bvt. Brig. Gen., U. S. A.

Brig. Gen. M. C. MEIGS,
Quartermaster-General, U. S. A., Washington, D. C.

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A.—*Statement of articles of clothing, camp and garrison equipage, and materials purchased and manufactured during the fiscal year ending June 30, 1874.*

A.—PURCHASES.

13,660 helmets, complete.
3,578 pairs helmets, side buttons.
2,578 pairs helmets, scrolls and rings.
1,209 helmet cords and tassels.
1,097 helmet top pieces and sockets.
1,225 helmet plumes.
29,409 uniform dress caps, complete.
988 uniform dress caps, pompons.
25,810 campaign-hats.
57,496 forage-caps.
32,875 forage-cap covers.
Metallic trimmings for hats, caps, and coats.:
82,500 bugles.
153,908 letters.
3,000 letters U. S.
2,500 wreaths.
8 crescents.
2,500 castles.
5,500 shells and flames.
21,289 eagles.
82,935 numbers.
29,000 crossed sabers.
18,700 crossed cannon.
720 halliards for storm-flags.
9 trumpets.
20 trumpet-crooks.
3,000 drumheads, batter.
2,397 drumheads, snare.
2,044 common tent-poles.
2 Sibley tents.
2 Sibley tent-poles.
402 sets stencil-plates.
7 pairs lasts, assorted.
1 oak tierce.
3,598⅓ yards black Italian cloth.
57,600 sheets cotton wadding.
44 yards black crape.
79,834¼ yards colored jeans.
14,821⅜ yards facing-cloth, assorted.
30,407 yards canvas padding
14,400 yards worsted braid, assorted.
5,020 pounds thread.
37,523 pairs boots.
78,133 pairs bootees.
160,585 pairs stockings.
250,000 pairs white Berlin gloves.
12,466 pairs buffalo overshoes.
1,500 buffalo overcoats.
22,874 pairs woolen mittens.
24 pairs buck mittens.
29,009 woolen blankets.
100 devices for signal corps.
95 pounds paper for patterns.
6,993 iron bunks.
8,784 sets slats for iron bunks.
10,000 single mosquito-bars.
4 spades.
54 shovels.
3 axes.
10,031 ax-helves.
1 hatchet.
1 pick-ax helve.
142 garrison-flags.
199 storm-flags.
578½ pounds sewing-silk.
7,200 spools sewing-silk.
6,152 ounces silk-twist.
46,584 spools thread, assorted.
500 pounds bees-wax.
5,100 packing-boxes.
2,400 pasteboard boxes.
60 press-boards.
50 pattern-boards.
60,112 pounds petroleum paper.
200 reams wrapping-paper.
5,116 pounds baling-rope.
4 sail-maker palms.
1 seal, clothing, and equipage.
10,000 tags.
1,500 pieces bed-sack tape.
150 pounds flax-twine.
300 pounds sealing-wax.
221,232 yards worsted cord, assorted.

B.—MANUFACTURES.

1 uniform-cap.
1,636 uniform-coats, music.
34,013 uniform-coats, privates'.
37,243 pairs trousers, foot.
35,323 pairs trousers, mounted.
12,071 pairs *overalls.
317 pairs of chevrons, ordnance-sergeants'.
204 pairs of chevrons, sergeant-majors'.
261 pairs of chevrons, quartermaster-sergeants'.
167 pairs of chevrons, commissary-sergeants'.
1,636 pairs of chevrons, first sergeants'.
6,117 pairs of chevrons, sergeants'.
5,513 pairs of chevrons, corporals'.
175 pairs of chevrons, hospital stewards'.
10,546 pairs of chevrons, service.
204 pairs of chevrons, miscellaneous.
9,420 pairs of trousers-stripes, sergeants'.
5,872 pairs of trousers-stripes, corporals'.
37 sets of slats for iron bunks.
13,726 *bed-sacks, single.
10,428 *stable-frocks.
39,202 blouses, lined.
7,875 blouses, unlined.
1,055 flannel shirts.
2,954 pairs drawers.

*Manufactured in depot, from stock of shelter-tents on hand. The other articles were manufactured in depot from materials on hand, or purchased during the fiscal year.

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2,007 great-coats, with double capes.
504 devices for Signal Corps.
62 ax-helves.
438 guidon cases.
7 sets of stencil letters.
8 sets of stencil numbers.
6 sets of stencils, complete.
105 drum-cords.
800 *wall-tents.
750 *wall-tent flies.
3,500 * common tents.
381 tent-pins, assorted.
267 joints of Sibley stove-pipe.
36 pick-axes.
59 pick-ax-helves.
24 books, miscellaneous.
45 spades.

Respectfully submitted.

J. D. BINGHAM,
Quartermaster, Brevet Brigadier General, U. S. Army,
QUARTERMASTER-GENERAL'S OFFICE,
September 26, 1874.

B.—*Statement showing expenditures on account of clothing, camp and garrison equipage, during the fiscal year ending June* 30, 1874.

Military Division of the Pacific	$83,238 36
Military Division of the Atlantic	105 00
Military Division of the South	260 00
Military Division of the Missouri	2,302 76
Depot at New York	11,263 24
Depot at Philadelphia	1,415,848 35
Depot at Washington	94 75
Depot at Jeffersonville	23,168 84
Depot at Chicago	2,300 00
Depot at Saint Louis	27 50
Total	1,538,609 00

Respectfully submitted.

J. D. BINGHAM,
Quartermaster, U. S. A., Brevet Brigadier General.
QUARTERMASTER-GENERAL'S OFFICE,
September 26, 1874.

C.—*Statement of expenditures on account of preservation of clothing, equipage, and materials from moth and mildew, during the fiscal year ending June* 30, 1874.

Subjected to the process:

145,160¾ yards of 3-4 sky-blue kersey, at 10 cents per yard	$14,516 04	
22,964¼ yards of 6-4 sky-blue kersey, at 20 cents per yard	4,592 85	
892,528¾ yards of 3-4 dark-blue flannel, at 6 cents per yard	53,551 67	
39,129 yards of 6-4 dark-blue flannel, at 12 cents per yard	4,695 48	
49,094¼ yards of 6-4 dark-blue cloth, at 20 cents per yard	9,818 85	
88,409 great-coats, at $1 each	88,409 00	
Total cost of treatment		$175,583 89
Cost of transportation of materials, &c., ordered for treatment, from Jeffersonville to Philadelphia, Pa	$5,829 06	
Cost of hauling at Philadelphia, Pa	2,166 25	
Cost of labor, handling, and inspecting	16,420 80	
Total amount of expenses		24,416 11
Total appropriation		200,000 00

Respectfully submitted.

J. D. BINGHAM,
Quartermaster, Brevet Brigadier General, U. S. A.
QUARTERMASTER-GENERAL'S OFFICE,
September 26, 1874.

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* Manufactured by contract, from materials furnished by the Quartermaster's Department.

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D.—*Statement of amounts received from the sale of surplus serviceable, (old pattern,) unserviceable, damaged, and irregular articles of clothing, &c., sold at the principal depots, &c.; also the amount derived from sales to officers during the fiscal year ending June* 30, 1874.

From sales at Jeffersonville, Ind	$433 75
From sales at Philadelphia, Pa	549,796 41
From sales at the other depots, &c., of the Quartermaster's Department	193,119 49
From sales to officers	*23,365 74
Total	766,715 39

Respectfully submitted.

J. D. BINGHAM,
Quartermaster and Bvt. Brig. Gen., U. S. A.

QUARTERMASTER-GENERAL'S OFFICE,
September 26, 1874.

E.—*Statement showing, as far as can be ascertained from the records of the Quartermaster-General's Office, the quantities of old-pattern clothing sold under the act of March* 3, 1873, *at the various depots and posts during the fiscal year ending June* 30, 1874; *also the amount realized from said sales.*

102,973	uniform-hats.
179,258	uniform-hat feathers.
211,162	uniform-hat eagles.
56,176	uniform-hat cross-sabers.
34,131	uniform-hat cross-cannons.
141	uniform-hat trumpets.
7,589	uniform-hat sockets.
140	uniform-hat wreaths for hospital-stewards.
1,905	uniform-hat cords and tassels.
1,208	uniform-hat shells and flames.
19,270	uniform-hat castles.
105,760	uniform-hat bugles.
1,572	uniform-caps, light artillery.
542	uniform-cap bands and tassels.
1,361	uniform-cap hair plumes.
895	uniform-cap tulips.
1,225	uniform-cap rings.
89,934	forage-caps.
25,884	forage-cap covers.
84,542	metallic letters.
724,563	metallic numbers.
7,639	uniform-coats, ordnance.
3,862	uniform-coats, engineers.
44,221	uniform-coats, artillery.
77,260	uniform-coats, infantry.
767	uniform-coats, assorted.
988	pairs metallic scales, non-commissioned staff.
4,460	pairs metallic scales, sergeants.
95,452	pairs metallic scales, corporals, &c.
2,501	buttons for metallic scales.
955	slides for metallic scales.
50,781	uniform-jackets, artillery.
145,293	uniform-jackets, cavalry.
5,377	uniform-jackets, assorted.
123,625	sack-coats, lined.
241,391	sack-coats, unlined.
10,903	pairs boots, pegged and sewed.
54,989	pairs bootees, pegged and sewed.
3,280	sashes.
398	pairs leggins.
451	gaiters.
2,820	leather stocks.
758	woolen blankets.
489	pairs chevrons, hospital-stewards'.
991	pairs chevrons, ordnance-sergeants'.
134	pairs chevrons, sergeant-majors'.
172	pairs chevrons, quartermaster-sergeants'.
3	pairs chevrons, commissary-sergeants'.
833	pairs chevrons, first sergeants'.
32,598	pairs chevrons, sergeants'.
3,662	pairs chevrons, corporals'.
359	pairs chevrons, service.
67,188	pairs chevrons, miscellaneous.
18,113	yards lace silk, half inch.
173,694	yards lace, sergeants, one and a half inch.
250,073	yards lace, corporal, half inch.
433,156	yards lace, three-eighths inch.
40,294	yards lace, miscellaneous.

The amount realized from the sale of the above-named articles of clothing was $478,161.79. This amount is included in the total amount of sales specified in statement marked D.

Respectfully submitted.

J. D. BINGHAM,
Quartermaster and Bvt. Brig. Gen., U. S. A.

QUARTERMASTER-GENERAL'S OFFICE,
September 26, 1874.

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* Of this amount, $15,484.12 were covered into the Treasury to be credited to appropriation for fiscal year ending June 30, 1874.

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F.—*Statement of the amounts received and expended by the Quartermaster's Department on account of clothing, camp and garrison equipage, during the fiscal year ending June* 30, 1874.

Receipts.	Amount.	Expenditures.	Amount.
Appropriated by Congress	$1,523,508 81	Expended for clothing and equipage	$1,538,609 00
Deposited by officers in the Treasury	15,484 12	Covered into the Treasury from sales	751,231 27
Received from sales	751,231 27	Balance in Treasury June 30, 1874	383 93
Total	2,290,224 20	Total	2,290,224 20

Respectfully submitted.

J. D. BINGHAM,
Brev. Brig. Gen. and Quartermaster, U. S. A.

QUARTERMASTER GENERAL'S OFFICE,
September 26, 1874.

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G.—*Statement of clothing, camp and garrison equipage, manufactured, purchased, issued, sold, lost, &c., in the Army of the United States during the fiscal year ending June 30, 1874.*

Articles.	On hand June 30, 1873.	Purchased during fiscal year ending June 30, 1874.	Manufactured during fiscal year ending June 30, 1874.	Taken up during fiscal year ending June 30, 1874.	Total on hand June 30, 1874.	Issued during fiscal year ending June 30, 1874.	Sold during fiscal year ending June 30, 1874.	Lost, destroyed, or worn out during fiscal year ending June 30, 1874.	Total issued, sold, lost, &c., during fiscal year ending June 30, 1874.	Total remaining on hand June 30, 1874.
Hats	216,670	25,810	.....	48	242,528	14,420	192,405	63	206,888	35,640
Uniform-caps	3,226	29,409	1	21	32,657	14,382	604	40	15,206	17,631
Forage-caps	251,757	57,496	.....	202	309,455	38,306	109,465	555	148,326	161,129
Cap-covers	51,358	32,875	.....	121	84,354	11,848	33,678	39	45,565	38,789
Cap-bugles	182,286	82,500	.....	1,444	266,230	1,930	156,029	8,463	165,422	100,808
Cap-letters	470,594	153,908	.....	1,363	625,865	776	322,903	31,099	354,778	271,087
Castles	12,795	2,500	.....	71	15,366	16	2,984	354	3,354	12,012
Shells and flames	4,074	5,500	.....	3	9,577	68	1,615	118	1,801	7,776
Cords and tassels	577,059	.....	.....	470	577,529	7,307	4,913	677	12,897	564,632
Ostrich-feathers	293,807	.....	.....	25,851	319,658	436	176,059	690	177,185	142,473
Eagles	305,559	21,289	.....	1,419	328,267	1,806	256,794	4,363	262,963	65,304
Numbers	1,363,197	82,935	.....	23,571	1,469,703	1,042	1,067,101	31,496	1,099,639	370,064
Crossed sabers	98,485	29,000	.....	406	127,891	273	70,316	8,063	78,652	49,239
Crossed cannon	41,344	18,700	.....	2	60,046	105	36,748	2,147	39,000	21,046
Trumpets	241	.....	.....	.....	241	.....	241	.....	241	.....
Tulips	1,602	.....	.....	13	1,615	10	1,426	77	1,513	102
Hair-plumes	1,982	1,224	.....	3	3,209	958	.....	39	997	2,212
Cap-rings	2,758	.....	.....	42	2,800	.....	2,649½	150½	2,800	.....
Hospital-stewards' hat cords and tassels	2,600	.....	.....	.....	2,600	2	1	21	24	2,576
Letters U. S., hospital-stewards'	132	3,000	.....	.....	3,132	135	6	104	245	2,867
Wreaths, hospital-stewards'	340	2,500	.....	34	2,874	141	159	19	319	2,555
Bands and tassels, (red)	594	1,209	.....	.....	1,803	778	546	5	1,329	474
Cap-eagles	123	.....	.....	.....	123	1	.....	.....	1	122
Sockets and top-pieces	54,009	1,097	.....	63,365	118,471	277	31,088	223	31,588	86,883
Cap-plates	206	.....	.....	.....	206	.....	176	.....	176	30
Helmets	44	13,660	.....	.....	13,704	8,069	.....	9	8,078	5,626
Buttons, side, pairs	.....	3,578	.....	54	3,632	415	.....	216	621	3,011
Scroll and rings, pairs	.....	2,578	.....	54	2,632	278	.....	199	477	2,155
Uniform-coats:										
Musicians'	4,067	.....	1,636	62	5,765	670	3,655	9	4,334	1,431
Privates'	224,556	.....	34,013	857	259,426	21,893	165,655	134	187,682	71,744
Metallic-scales:										
Non-commissioned staff	3,729	.....	.....	4	3,733	5	3,011	68	3,084	649
Sergeants'	11,839½	.....	.....	113	11,952½	30	8,540	732	9,302	2,650½
Corporals' and privates'	332,377½	.....	.....	3,221½	335,599	150	277,284	6,165½	283,599½	51,999½
Buttons for scales	11,225½	.....	.....	.....	11,225½	2	9,218	489	9,709	1,516½
Slides for scales	137	.....	.....	8	145	.....	.....	145	145	.....

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Sashes	8,183			45	8,228	91	3,872	264	4,227	4,001
Epaulets, gilt	1			18	19					19
Shoulder-knots, assorted, mohair	40				40					40
Uniform-jackets, miscellaneous	354,627			1,246	355,873	345	210,688	16	211,049	144,824
Trousers:										
Foot	173,278		37,243	480	211,001	54,712	3,774	647	59,133	151,868
Mounted	66,627		35,423	521	102,571	27,950	5,838	263	34,051	68,520
Overalls	10,374		12,071	5	22,450	7,340	95	4	7,439	15,011
Flannel sack-coats:										
Lined	270,291		39,202	457	309,950	38,455	127,264	631	166,350	143,600
Unlined	318,911		7,875	323	327,109	14,975	250,904	538	266,417	60,692
Shirts:										
Flannel	267,176		1,055	100	268,331	92,766	13,942	4,169	110,877	157,454
Knit	3,371			58	3,429	758	88	44	890	2,539
Drawers	585,577		2,954	117	588,648	124,798	2,353	1,097	128,248	460,400
Boots	89,322½	37,523		114	126,959½	38,164	16,786	345½	55,295½	71,664
Bootees	395,473½	78,133	1	337½	473,945	57,655	70,374½	490	128,519½	345,425½
Leggins	4,512				4,512	38	1,987		2,025	2,487
Gaiters	4,360				4,360	89	451		540	3,820
Stockings	135,658	160,585		1,778½	298,021½	171,654	1,892	1,549	175,095	122,926½
Berlin gloves	14,575	250,000			264,575	94,966	1,153	159	96,278	168,297
Great-coats:										
Cavalry	87,833		2,007	14	89,854	9,024	7,496	220	16,740	73,114
Infantry	255,613			1,477	257,090	10,565	36,242	692	47,499	209,591
Lined	5,504			5	5,509	517	14		531	4,978
Blankets:										
Woolen	60,638	29,009		134	89,781	32,580	4,828	2,899	40,307	49,474
Rubber	392,925			14	392,939	1,609	590	181	2,380	390,559
Painted	2,082			1	2,083	64	319		383	1,700
Ponchos:										
Rubber	253,928			6	253,934	2,081	10,541	321	12,943	240,991
Painted	1,590				1,590	96	1	4	101	1,489
Stable-frocks	36,665			57	36,722	11,002	221	274	11,497	25,225
Buffalo-overshoes	5,878½	12,466			18,344½	4,488	535	88½	5,111½	13,233
Buffalo-overcoats	545	1,500			2,045		31		31	2,014
Mittens, wool	14,982	22,874		32	37,888	11,992	132	111	12,235	25,653
Mittens, buck	2,507	24			2,531	22	9		31	2,500
Aigulet, gilt	3			8	11		11		11	
Aigulet, mohair	30				30					30
Capes, great-coat				1,168	1,168	147	1,000		1,147	21
Cap-lyres	36				36					36
Cap-visors				530	530		530		530	
Crescents		8		134	142	69		73	142	
Pompons	45	988		3,036	4,069	4,064		5	4,069	
Pattern, clothing, sets	4				4					4
Pattern-paper, manilla, sheets		95			95			95	95	
Pattern, tent	2				2					2
Pattern, tent-flies	2				2					2
Chevrons:										
Device signal-corps		100	504		604	365		2	367	237
Ordnance-sergeant	361½		317	1	679½	86	231½		317½	362
Sergeant-major	4,233		204	1	4,438	42	3,235½		3,277½	1,160½

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G.—*Statement of clothing, camp and garrison equipage, purchased, issued, sold, lost, &c.*—Continued.

Articles.	On hand June 30, 1873.	Purchased during fiscal year ending June 30, 1874.	Manufactured during fiscal year ending June 30, 1874.	Taken up during fiscal year ending June 30, 1874.	Total on hand June 30, 1874.	Issued during fiscal year ending June 30, 1874.	Sold during fiscal year ending June 30, 1874.	Lost, destroyed, or worn out during fiscal year ending June 30, 1874.	Total issued, sold, lost, &c., during fiscal year ending June 30, 1874.	Total remaining on hand June 30, 1874.
Chevrons—Continued.										
Quartermaster-sergeant	7, 891½	.....	261	.....	8, 152½	53	4, 010	.....	4, 063	4, 089½
Commissary-sergeant	740	.....	167	4, 134	5, 041	96	4, 945	.....	5, 041	.....
First sergeant	17, 850½	.....	1, 636	1	19, 487½	467	10, 643	19	11, 129	8, 358½
Sergeant	39, 627½	.....	6, 117	39	45, 783½	2, 703	21, 035	85	23, 823	21, 960½
Corporal	63, 729½	.....	5, 513	51	69, 293½	2, 433½	46, 775	96	49, 304½	19, 989
Hospital steward	1, 762½	.....	22	1	1, 785½	153	717½	.....	870½	915
Caduceus	75	.....	153	.....	228	11	5	.....	16	212
Service	109, 967½	.....	10, 546	.....	120, 513½	1, 668	81, 285½	13	82, 966½	37, 547
Miscellaneous	1, 317½	.....	204	2, 083	3, 604½	358	3, 238	8½	3, 604½	.....
Lace, yards:										
1¼-inch, sergeants'	227, 771¾	.....	.....	3	227, 774¾	2, 386 7-12	197, 067½	213¼	199, 667 7-12	28, 107 1-6
½-inch, corporals'	362, 974 7-36	.....	.....	½	362, 974 25-36	2, 518⅞	276, 576 11-12	63	279, 158 19-24	83, 815 65-72
⅜-inch	1, 063, 769¾	.....	.....	.....	1, 063, 769¾	194½	432, 799	.....	432, 993½	630, 776¼
Miscellaneous	17, 608⅜	.....	.....	58½	17, 666⅞	123	17, 440⅜	103¼	17, 666⅞	.....
Stripes, sergeant, pairs	45	.....	9, 420	728	10, 193	3, 026½	59½	31	3, 117	7, 076
Stripes, corporal, pairs	73	.....	5, 872	295	6, 240	811½	19½	16	847	5, 393
Worsted cord, assorted, yards	15, 954	221, 232	.....	75	237, 261	.....	1, 500	166, 286½	167, 786½	69, 474½
Pillow-cases	7	.....	.....	.....	7	.....	7	.....	7	.....
Slats	3, 939	8, 784	37	544	13, 304	.....	.....	9, 184	9, 184	4, 120
Iron bunks	27, 277	6, 993	.....	142	34, 412	.....	1, 372	525	1, 897	32, 515
Bedsteads	1, 080	.....	.....	.....	1, 080	.....	110	27	137	943
Bed-sacks:										
Single	85, 689	.....	13, 736	195	99, 620	.....	3, 903	10, 075	13, 978	85, 642
Double	42, 447	.....	.....	180	42, 627	.....	1, 824	4, 771	6, 595	36, 032
Mosquito-bars:										
Single	55, 766	10, 000	.....	142	65, 908	.....	1, 920	3, 999	5, 919	59, 989
Double	6, 554	.....	.....	134	6, 688	.....	67	65	132	6, 556
Spades	90, 334	4	45	238	90, 621	.....	816	1, 696	2, 512	88, 109
Spade-slings	1, 307	.....	.....	65	1, 372	.....	.....	.....	.....	1, 372
Shovels	52, 925	54	.....	151	53, 130	.....	1, 376	2, 559	3, 935	49, 195
Shovels, coal	4	.....	.....	.....	4	.....	.....	.....	.....	4
Shovel-handles	261	.....	.....	.....	261	.....	.....	.....	.....	261
Knives, shoe	96	.....	.....	.....	96	.....	.....	.....	.....	96
Lasts, assorted pairs	.....	7	.....	.....	7	.....	.....	.....	.....	7
Nails, cut, kegs	6	.....	.....	.....	6	.....	.....	6	6	.....
Nails, shoe, papers	363	.....	.....	.....	363	.....	363	.....	363	.....
Tierces, oak	.....	1	.....	.....	1	.....	.....	1	1	.....

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Trucks	12					12								12
Callipers	1					1								1
Chisels, box	12					12								12
Hatchets, carpenters	60					60								60
Axes	71,078	3		224		71,305			2,995	2,983			5,978	65,327
Ax-helves	63,231	10,031	62	569		72,893			1,202	15,020			16,282	57,611
Ax-slings	30,298					30,298			98	10			108	30,190
Camp-kettles	95,102			250		95,352			809	1,775			2,584	92,768
Mess-pans	414,805			450		415,255			537	1,851			2,388	412,867
Hatchets	118,687	1		11		118,699			905	1,439			2,344	116,355
Hatchet-helves	134,360			114		134,474			475	2,364			2,839	131,635
Hatchet-slings	26,933			162		27,095			8				8	27,087
Sand-fly bars	140					140								140
Flags:														
Garrison	927	142		10		1,079			17	104			121	958
Storm	1,051	199		37		1,287			40	369			409	878
Garrison and storm halliards	2,002	720		9		2,731			27	220			247	2,484
Recruiting	1,366			1		1,367			9	94			103	1,264
Recruiting halliards	3,021			3		3,024			5	57			62	2,962
Camp colors	5,781			8		5,789			7	56			63	5,726
Camp color cases	7					7								7
Guidons	1,848					1,848			12	71			83	1,765
Guidon-cases	227		438	11		676			2	9			11	665
Standards, cavalry	904					904				1			1	903
National colors	703			1		704				7			7	697
Regimental colors	963			1		964				6			6	958
Color-belts	34			35		69								69
General hospital	707					707								707
Ambulance, or red	3					3								3
Post and field hospital	696					696								696
Ambulance and guidon	4,793					4,793								4,793
Designating, corps, &c	317					317								317
Signal				2		2				2			2	
Miscellaneous	26					26								26
Color-cases	31					31			1				1	30
Color cords and tassels	140					140								140
Color belts and slings	979					979			1	9			10	969
Color-belt slings	1,239					1,239								1,239
Staffs, assorted	2,707					2,707								2,707
Flag-poles	1					1								1
Trumpets	3,073	9		2		3,084			25	205			230	2,854
Bugles, with extra mouth-pieces	3,358			17		3,375			115	127			242	3,133
Bugle and trumpet extra-mouth-pieces and crooks	736	20		71		827			3	37			40	787
Cords and tassels	17,965			2		17,967			125	362			487	17,480
Fifes	6,327			2		6,329			20	214			234	6,095
Drums:														
Complete	4,610			11		4,621			52	207			259	4,362
Heads, batter	10,669	3,000		55		13,744			176	1,555			1,731	12,013
Heads, snare	12,789	2,397		58		15,244			124	1,144			1,268	13,976
Slings	10,571			169		10,740			143	191			334	10,406
Sticks, pairs	16,972			89		17,061			19	206			225	16,836
Stick-carriages	13,136			20		13,156			10	27			37	13,119

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G.—*Statement of clothing, camp and garrison equipage, manufactured, purchased, issued, sold, lost, &c.*—Continued.

Articles.	On hand June 30, 1873.	Purchased during fiscal year ending June 30, 1874.	Manufactured during fiscal year ending June 30, 1874.	Taken up during fiscal year ending June 30, 1874.	Total on hand June 30, 1874.	Issued during fiscal year ending June 30, 1874.	Sold during fiscal year ending June 30, 1874.	Lost, destroyed, or worn out during fiscal year ending June 30, 1874.	Total issued, sold, lost, &c., during fiscal year ending June 30, 1874.	Total remaining on hand June 30, 1874.
Drum—Continued.										
Cords	4,493	.....	105	117	4,715	.....	142	523	665	4,050
Snares, sets	9,451	.....	.....	44	9,495	.....	86	312	398	9,097
Cases	5,837	.....	.....	3	5,840	.....	48	63	111	5,729
Tents:										
Hospital	5,671	.....	.....	132	5,803	.....	63	171	234	5,569
Hospital flies	4,800	.....	.....	250	5,050	.....	63	245	308	4,742
Hospital poles, sets	6,215	.....	.....	211	6,426	.....	31	170⅔	201⅔	6,224⅓
Wall	6,637	800	.....	50	7,487	.....	316	788	1,104	6,383
Wall-flies	5,611	750	.....	37	6,398	.....	234	1,680	1,914	4,484
Wall-poles, sets	11,204⅓	.....	.....	505	11,709⅓	.....	187⅔	713⅔	901⅓	10,808
Common	26,058	3,500	.....	315	29,873	.....	1,106	3,096	4,202	25,671
Common poles, sets	28,703	2,044	.....	1,083	31,830	.....	641⅓	2,481⅔	3,123	28,707
Shelter	687,965	.....	.....	6,192½	694,157½	.....	3,902	35,422½	39,324½	654,833
Shelter-poles, sets	56,086 5-6	.....	.....	166	56,252 5-6	.....	.....	3,165	3,165	53,087 5-6
Sibley	753	2	.....	.....	755	.....	28	9	37	718
Sibley poles	1,377	2	.....	8	1,387	.....	144	128	272	1,115
Sibley tripods	4,056	.....	.....	.....	4,056	.....	164	3	167	3,889
Miscellaneous	15	.....	.....	.....	15	.....	.....	.....	.....	15
Extra hospital poles	43	.....	.....	.....	43	.....	31	9	40	3
Extra wall-poles	14	.....	.....	33	47	.....	35	12	47	.....
Shelter-tent guys	2,960	.....	.....	.....	2,960	.....	.....	.....	.....	2,960
Rope, feet	940,011	.....	.....	.....	940,011	.....	.....	7,836	7,836	932,175
Tent-pins, assorted	1,673,319	.....	381	1,193	1,674,893	.....	14,711	220,003	234,714	1,440,179
Sibley-tent stoves	3,045	.....	.....	.....	3,045	.....	18	49	67	2,978
Sibley-tent pipe, joints	3,649	.....	267	12	3,928	.....	138	142	280	3,648
Sibley-tent pipe, sets	2,692	.....	.....	.....	2,692	.....	28	39	67	2,625
Sibley-tent pipe, elbows	23	.....	.....	.....	23	.....	.....	1	1	22
Iron pots	2,603	.....	.....	.....	2,603	.....	53	60	113	2,490
Pickaxes	80,443	.....	36	406	80,885	.....	740	908	1,648	79,237
Pickax-helves	91,025	1	59	170	91,255	.....	290	2,709	2,999	88,256
Pickax-slings	1,146	.....	.....	.....	1,146	.....	.....	.....	.....	1,146
Books:										
Clothing-account, company	12,131	.....	.....	4	12,135	.....	10	135	145	11,990
Descriptive, company	12,664	.....	.....	9	12,673	.....	56	110	166	12,507
Order, company	11,528	.....	.....	7	11,535	.....	46	237	283	11,252
Morning report, company	13,424	.....	.....	24	13,448	.....	10	128	138	13,310
Post order	5,697	.....	.....	2	5,699	.....	.....	44	44	5,655

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Post morning report	6,434			2	6,436		5	15	20	6,416
Post letter	5,954			3	5,957		7	37	44	5,913
Post-guard report	2,529			11	2,540		2	289	291	2,249
Regimental general order	1,931			1	1,932			6	6	1,926
Regimental letter	1,681			1	1,682		1	18	19	1,663
Regimental descriptive	2,652			3	2,655			11	11	2,644
Regimental index	2,522				2,522		2	8	10	2,512
Regimental order	2,367				2,367		1	14	15	2,352
Target-practice	2,407			3	2,410		40	24	64	2,346
Miscellaneous	2,154		24	62	2,240			476	476	1,764
Stencil-brushes, number	24				24					24
Stencil-letters, sets	246		7	4	257			7	7	250
Stencil-numbers, sets	238		8	4	250			7	7	243
Stencils complete, sets	102	402	6		510			1	1	509
Stencil-tools, sets	1				1					1
Miscellaneous:										
Hats, (light colored)	16				16					16
Fatigue-frocks, cotton	59		10, 428		10, 487			11	11	10, 476
Buckram, yards	5, 258¼				5, 258¼		5, 216¼		5, 216¼	42
Burlaps, yards	13, 423			11, 635	25, 058		15, 132	6, 708	21, 840	3, 218
Cloth, black Italian, yards		3, 598½		2, 038½	5, 636½			5, 636½	5, 636½	
Cloth, orange, yards	3⅜			82⅝	86 1-6	3⅜			3⅜	82⅝
Cloth, scarlet, yards	5, 436⅜			104 19-24	5, 541 13-24	1½	5, 436⅜	36½	5, 475	66 13-24
Cotton wadding, sheets	22, 254	57, 600		37, 164	117, 018		8	117, 010	117, 018	
Cotton webbing, 1 inch, yards	49, 186½				49, 186½		4, 473		4, 473	44, 713½
Crape, black, yards		44			44					44
Jeans, colored, yards	16, 627¾	79, 834¾		1, 412	97, 874½			94, 840	94, 840	3, 034½
Linen, brown, yards	1, 490½				1, 490½		186	75	261	1, 229½
Linen duck, yards	9, 504⅜			3, 319	12, 823⅜			75	75	12, 748⅜
Hooks, gross	2, 957 53-72			439	3, 396 53-72			3, 396 53-72	3, 396 53-72	
Eyes, gross	2, 768 55-72			475	3, 243 55-72			3, 243 55-72	3, 243 55-72	
Material:										
Dark-blue uniform cloth, 6-4	94, 210 11-24			22, 509½	116, 719 23-24	41½	24, 718	60, 845⅜	85, 605¼	31, 114 17-24
Dark-blue uniform cloth, 3-4	35, 116 11-16			35⅝	35, 152 7-16	34	1, 159½	29¼	1, 223	33, 926 7-16
Dark-blue flannel, 6-4	28, 362			1, 729½	30, 091½	51	4, 930	25, 110½	30, 091½	
Dark-blue flannel, 3-4	256, 523			4, 220⅜	260, 743⅛	15¾	59, 541⅜	201, 186⅛	260, 743⅛	
Dark-blue cloth, 6-4, (cap)	161¼				161¼	12	89¼		101¼	60¼
Sky-blue kersey, 6-4	24, 795			3, 600	28, 395	117⅛	326	13, 364⅜	13, 807⅛	14, 587⅛
Sky-blue kersey, 3-4	506, 099			10, 593	516, 692	275 7-12	22, 253	329, 899½	352, 427 5-6	164, 264 1-6
Facing-cloth, assorted	63, 766	14, 821⅛		8, 501⅞	87, 089½		30, 644½	17, 899 7-12	48, 544 1-12	38, 545 1-6
White-wool flannel	4, 429				4, 429		4, 050½	378¼	4, 429	
Gray shirting	491, 853			6, 000	497, 853		8, 275¼	133, 164½	141, 439¾	356, 413¼
Scarlet flannel	1, 336¾	40			1, 376¾	40	1, 216½	120½	1, 376¾	
Brown drilling	221, 756			16, 703¼	238, 459¼		160⅜	73, 402	73, 562⅜	164, 896⅜
Brown muslin	439, 827				439, 827		244½	1, 509¾	1, 754¼	438, 072¾
Bleached muslin	2, 858¾				2, 858¾		⅝¼	10	99¾	2, 759
Canton flannel	345, 406			40	345, 446		345½	8, 832	9, 177½	336, 268¾
Flannel, assorted	1, 002, 925			150	1, 003, 075		19, 156¾	42, 047¼	61, 204⅛	941, 870½
Black silesia	33, 397	74, 523		724 9-40	108, 644 9-40		14, 011	82, 324 7-20	96, 335 7-20	12, 308⅞
Canvas padding	4, 673	30, 407		578½	35, 658½		1, 917½	31, 530¾	33, 448¼	2, 210¼
Silk lace, assorted	22, 341				22, 341		22, 341		22, 341	
Worsted braid, assorted	88, 088	14, 400		277	102, 765		88, 088	10, 764	98, 852	3, 913

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G.—*Statement of clothing, camp and garrison equipage, manufactured, purchased, issued, sold, lost, &c.*—Continued.

Articles.	On hand June 30, 1873.	Purchased during fiscal year ending June 30, 1874.	Manufactured during fiscal year ending June 30, 1874.	Taken up during fiscal year ending June 30, 1874.	Total on hand June 30, 1874.	Issued during fiscal year ending June 30, 1874.	Sold during fiscal year ending June 30, 1874.	Lost, destroyed, or worn out during fiscal year ending June 30, 1874.	Total issued, sold, lost, &c., during fiscal year ending June 30, 1874.	Total remaining on hand June 30, 1874.
Material—Continued.										
Buttons, assorted, gross	133,848	.....	.....	3,783½	137,631½	.....	7,149 7-9	14,692 21-144	21841 133-144	115789 59-144
Buckles, assorted	193	.....	.....	.....	193	.....	.....	.....	.....	193
Thread, pounds	12,941	5,020	.....	1,168	19,129	.....	3½	5,544½	5,547½	13,581½
Thread, skeins	1,119	.....	.....	.....	1,119	.....	478	125	603	516
Lacing cord, pounds	7,492	.....	.....	.....	7,492	.....	.....	.....	.....	7,492
Lacing cord, feet	200,997	.....	.....	.....	200,997	.....	.....	.....	.....	200,997
Bunting	153⅓	.....	.....	.....	153⅓	.....	.....	1⅓	1⅓	151 5-6
Rope, pounds, for halliards	3,500	.....	.....	.....	3,500	.....	.....	.....	.....	3,500
Duck, cotton, 8 oz	2,482¼	.....	.....	.....	2,482¼	.....	.....	.....	.....	2,482¼
Duck, cotton, yards	78,767	.....	.....	.....	78,767	.....	4	16,740⅝	16,744⅝	62,022⅓
Needles, papers	1,237	.....	.....	.....	1,237	.....	.....	.....	.....	1,237
Pins, papers	5	.....	.....	11	5	.....	.....	.....	.....	5
Silk, sewing, pounds	54¾	578¼	.....	.....	644¼	.....	.....	536½	536½	108⅛
Silk, sewing, spools	375	7,200	.....	1,349	8,924	.....	.....	8,619	8,619	305
Silk, twist, oz	452½	6,152	.....	2,064	8,668½	.....	.....	6,632	6,632	2,036½
Thread, assorted, spools	7,953	46,584	.....	15,726	70,263	.....	.....	53,068	53,068	17,195
Baling-presses, number	21	.....	.....	1	22	.....	.....	.....	.....	22
Baskets, number	2	.....	.....	.....	2	.....	.....	.....	.....	2
Beeswax, pounds	200	500	.....	.....	700	.....	.....	700	700	.....
Boxes, packing, number	133	5,100	.....	.....	5,233	.....	.....	5,225	5,225	8
Boxes, pasteboard, number	.....	2,400	.....	.....	2,400	.....	.....	2,400	2,400	.....
Brass, sheets, pounds	25	.....	.....	.....	25	.....	.....	25	25	.....
Brushes, cloth, number	36	.....	.....	.....	36	.....	.....	.....	.....	36
Brushes, dusting, number	6	.....	.....	.....	6	.....	.....	.....	.....	6
Brushes, marking, number	24	.....	.....	.....	24	.....	.....	.....	.....	24
Boards, press, number	.....	60	.....	.....	60	.....	.....	.....	.....	60
Boards, pattern, sheets	.....	50	.....	.....	50	.....	.....	.....	.....	50
Calculators, expeditions, number	1	.....	.....	.....	1	.....	.....	.....	.....	1
Cases, rosewood and glass, number	3	.....	.....	.....	3	.....	.....	.....	.....	3
Cloth-beams, number	1	.....	.....	.....	1	.....	.....	.....	.....	1
Cloth-seals, pounds	2,800	.....	.....	8,165	10,965	.....	10,965	.....	10,965	.....
Crayon, boxes, number	697	.....	.....	.....	697	.....	.....	34	34	663
Cutters' tables, number	28	.....	.....	.....	28	.....	.....	.....	.....	28
Cuttings, cloth, pounds	5,600	.....	.....	25,733	31,333	.....	31,333	.....	31,333	.....
Cuttings, cotton, pounds	160	.....	.....	655	815	.....	815	.....	815	.....
Cuttings, kersey, pounds	6,500	.....	.....	39,202	45,702	.....	45,702	.....	45,702	.....
Cuttings, tent, pounds	.....	.....	.....	18,250	18,250	.....	18,250	.....	18,250	.....

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Cuttings, burlaps, pounds				2,603	2,603		2,603		2,603	
List, pounds				535	535		535		535	
Machines, testing-cloth, number	5				5					5
Machines, measuring, number	4				4					4
Matches, boxes, number	232				232			232	232	
Marline, pounds	2,156½				2,156½			425	425	1,731½
Measuring-rods, number	1				1					1
Paper, petroleum, pounds	11,693	60,112			71,805			67,026	67,026	4,779
Paper, petroleum, sheets	20				20			20	20	
Paper, wrapping, pounds	9,000			11,053	20,053		19,885	168	20,053	
Paper, wrapping, sheets	200				200			200	200	
Paper, wrapping, reams	28½	200			228½			223¾	223¾	5¾
Resin, pounds	360				360			360	360	
Rings, assorted, gross	11,379				11,379					11,379
Rope, baling, pounds	2,400	5,116		18,862	26,378		22,362		22,362	4,016
Rope, ¼-inch, manila, pounds	65,379				65,379			14,436¼	14,436¼	50,942¾
Rope, tent, pounds	659				659			66	66	593
Rope, wall-tent, sets	80				80					80
Rubbers, sandstone, number	12				12					12
Sail-palms, number	43	4			47					47
Screws, gross	155				155			155	155	
Screws, bed, number	69				69					69
Seal clothing and equipage, number	5	1		1	7					7
Sockets, Sibley-tent poles, number	12				12					12
Stay-binding, dozen	3,311				3,311			320	320	2,991
Straps, hickory, number	110				110			110	110	
Straps, iron, pounds	2,400			7,067	9,467		9,467		9,467	
Straps, Sibley-tent, number	5,497				5,497					5,497
Tags, number	3,200	10,000			13,200			13,200	13,200	
Tape, bed-sack, pieces	34	1,500		280	1,814			1,814	1,814	
Tape, black, pieces	24				24					24
Tape drawers, pieces	35,558				35,558			1,254	1,254	34,304
Tenting, pounds	10,900			40,869	51,769		51,769		51,769	
Tent-buttons, number	202,332				202,332			42,820	42,820	159,512
Tent-chains, sets	5,635				5,635					5,635
Tent-slides, number	282,242				282,242			15,620	15,620	266,622
Turpentine, gallons	15				15			15	15	
Twine, blocking, pounds	359				359			318	318	41
Twine, cotton, pounds	7,669			8	7,677			46	46	7,631
Twine, flax, pounds	80	150			230			230	230	
Wax, sealing, pounds	90	300			390			390	390	

Respectfully submitted.

J. D. BINGHAM,
Quartermaster, U. S. A.

QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., September 26, 1874.

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H.—*Statement showing quantity of clothing issued to the destitute poor of the District of Columbia, under act of Congress approved April 20, 1871, during the fiscal year ending June 30, 1874; also showing aggregate value of clothing issued under said act since the date of its passage.*

69 pairs stockings.	427 great-coats, foot and mounted.
190 pairs trousers, foot.	47 woolen blankets.
21 sack-coats, lined.	218 pairs boots.
103 sack-coats, unlined.	98 pairs bootees.
49 pairs trousers, mounted.	47 shirts.
396 pairs drawers.	

Value of issues during fiscal year ending June 30, 1871	$811 50
Value of issues during fiscal year ending June 30, 1872	1,907 10
Value of issues during fiscal year ending June 30, 1873	3,398 00
Value of issues during fiscal year ending June 30, 1874	3,882 87
Total	9,999 47

Respectfully submitted:

J. D. BINGHAM,
Quartermaster, Bvt. Brig. General, U. S. A.

QUARTERMASTER-GENERAL'S OFFICE,
September 26, 1874.

I.—*Statement showing number of claims received and acted upon during the fiscal year ending June 30, 1874, on account of clothing and equipage.*

Nine claims received, amounting to	$9,122 24
Three claims referred to the Third Auditor of the Treasury, recommended for settlement, amounting to	561 99
Eight claims referred to Third Auditor of the Treasury, recommended to be rejected, amounting to	9,519 95

Respectfully submitted:

J. D. BINGHAM,
Quartermaster, Bvt. Brig. General, U. S. A.

QUARTERMASTER-GENERAL'S OFFICE,
September 26, 1874.

K.—*Statement of returns of clothing, camp and garrison equipage, received, examined, and transmitted to the Treasury Department, and of letters received and written, during the fiscal year ending June 30, 1874.*

Number of returns of clothing and equipage on hand June 30, 1873	376
Number of returns of clothing and equipage received during fiscal year	4,153
Total	4,529
Number of returns of clothing and equipage examined and transmitted to Treasury Department	3,460
Returns remaining on hand June 30, 1874	1,069
Number of letters received pertaining to settlement of officers' accounts	4,004
Number of letters received pertaining to purchase, manufacture, and issue of clothing and equipage	2,166
Total	6,170
Number of letters written pertaining to settlement of officers' accounts	8,590
Number of letters written pertaining to purchase, manufacture, and issue of clothing and equipage	3,271
Total	11,861

Respectfully submitted:

J. D BINGHAM,
Quartermaster, Bvt. Brig. General, U. S. A.

QUARTERMASTER-GENERAL'S OFFICE,
September 26, 1874.

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V.—*Report of Maj. M. I. Ludington, Quartermaster, U. S. A.*

WAR DEPARTMENT,
QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., August 29, 1874.

GENERAL: I have the honor to submit the following report of the operations of this Office pertaining to transportation, regular and miscellaneous supplies, barracks and quarters, miscellaneous claims, and claims under the act of July 4, 1864, during the fiscal year ending June 30, 1874.

INDEBTED RAILROAD COMPANIES.

At the close of the fiscal year ending June 30, 1873, there was due the United States from railroad companies which purchased railway-material and rolling-stock under the provisions of Executive orders of August 8 and October 14, 1865, and for repairs to railroads during the war, the sum of $4,658,924.04. During the fiscal year ending June 30, 1874, interest has accrued upon this indebtedness and expenses have been incurred to the amount of $98,479.77, and payments in cash and by transportation and postal services have been made and credited to the respective companies to the amount of $116,790.91.

On the 1st day of July, 1874, there remained an indebtedness of $1,897,397.03 to be collected by the Quartermaster's Department, not including the sum of $43,754.40 due from the Mississippi, Gainesville and Tuscaloosa Railroad Company, which cannot be collected by reason of the bankruptcy of the company; and also not including the amount due from the East Tennessee and Virginia, the East Tennessee and Georgia, the Nashville and Chattanooga, and the Nashville and Decatur Railroad Companies, $2,699,470.60, compromised under the act of March 3, 1871, for $1,265,000, and made payable to the assistant treasurer of the United States at New York City.

The actual decrease of the debt during the year, including the payment of accrued interest, but not including the reduction by compromise, was $28,311.14.

Accompanying this report is a statement, marked A, showing the original indebtedness of each company; the total increase on account of interest and expenses; the increase or decrease of the debt of each company during the year; the payments made during the year; the total payments to June 30, 1874; and the balance unpaid June 30, 1874.

The indebtedness of the Alabama and Chattanooga Railroad Company was fully discharged during the year by the payment in cash, and by transportation and postal services, of the balance due, $4,037.74.

The Alexandria, Loudoun and Hampshire, the Mobile and Ohio, and the southwest branch of the Pacific Railroad of Missouri, (now part of the Atlantic and Pacific Railroad,) reduced their indebtedness, respectively, $2,387.20, $31,653.36, and $14,182.30; total, $48,222.86, in addition to paying on account of interest $5,559.71; making their total payments $53,782.57.

The indebtedness of the Edgefield and Kentucky, the Knoxville and Kentucky, the McMinnville and Manchester, the Memphis, Clarksville and Louisville, the Memphis and Little Rock, the Nashville and Northwestern, and the Selma, Rome and Dalton Railroad Companies has increased $83,262.67. These companies, however, paid on said indebtedness $8,367.85.

In addition to the amount stated to have been received and applied to the liquidation of the debts of these companies, accounts for the

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transportation of troops and property of the United States remain unadjusted as follows, to wit:

In the Treasury Department, for services prior to July 1, 1872.

East Tennessee and Virginia Railroad Company	$20 11
East Tennessee and Georgia Railroad Company	22 83
Mobile and Ohio Railroad Company	42,299 93
Memphis, Clarksville and Louisville Railroad Company	6,343 03
Nashville and Northwestern Railroad Company	190 40
Selma, Rome and Dalton Railroad Company	1,880 8
Missouri Pacific Railroad Company	841 00
Edgefield and Kentucky Railroad Company	48 56
Total	51,646 74

In the Treasury Department, for services since July 1, 1872.

Mobile and Ohio Railroad Company	$2,145 24
Memphis, Clarksville and Louisville Railroad Company	91 24
Total	2,236 48

There is also due for postal services rendered by these railroad companies the following sums, to wit:

For services prior to July 1, 1872.

Knoxville and Kentucky Railroad Company, for services from October 1, 1871, to June 30, 1872	$540 75
McMinnville and Manchester Railroad Company, for services from July 1, 1870, to June 30, 1872	3,500 0
Memphis and Little Rock Railroad Company, for services from July 1, 1871, to June 30, 1872	13,400 0
Nashville and Northwestern Railroad Company, for services from September 1, 1867, to August 5, 1868	2,565 00
For services from July 1, 1871, to June 30, 1872	12,750 00
Total	32,755 75

For services since July 1, 1872.

Knoxville and Kentucky Railroad Company	$1,482 00
McMinnville and Manchester Railroad Company	1,554 37
Memphis and Little Rock Railroad Company	26,800 00
Nashville and Northwestern Railroad Company	25,981 31
Selma, Rome and Dalton Railroad Company	47,500 00
Total	103,317 68

These sums, due for military transportation and postal service, both prior and subsequent to July 1, 1872, should all be placed to the credit of the respective companies. Attention is, however, invited to the fact that under the provisions of the act making appropriations for the legislative, executive, and judicial expenses of the Government for the year ending June 30, 1875, approved June 20, 1874, directing "that from and after the 1st day of July, 1874, and for each year thereafter, the Secretary of the Treasury shall cause all unexpended balances of appropriations which shall have remained upon the books of the Treasury for two fiscal years to be carried to the surplus fund and covered into the Treasury," * * * * there is no money with which to pay the accounts for services prior to July 1, 1872; an appropriation is, therefore, necessary before the companies can receive credit for these amounts,

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which credit, however, in case of transportation service, is to be given as at date of the first of the month succeeding that in which the service was rendered.

In the last annual report attention was invited to the necessity of such legislation as would authorize the Post-Office Department to pay over to this Department the postal earnings of the indebted railroad companies, that the amount might be credited to the companies according to contract. As the difficulties then referred to still exist, I renew my suggestions for such legislation as will remove them, viz; the passage of a law authorizing the Postmaster-General and the Auditor of the Treasury for the Post-Office Department to pay to the Quartermaster's Department the amount due and to become due for postal services rendered by indebted railroad companies, until notified by the Quartermaster-General that the companies are no longer indebted to the Quartermaster's Department.

No progress has been made in the suits against the Nashville and Northwestern and the McMinnville and Manchester Railroad Companies, so far as I am advised.

The suit against the Knoxville and Kentucky Railroad Company is, I am informed, in a fair way to be settled under the act of March 3, 1871.

Suit has been commenced against the Memphis and Little Rock Railroad Company to recover the amount, $92,845.47, due from that company.

A suit, commenced by individual creditors, is pending against the Selma, Rome and Dalton Railroad Company. The claim of the United States against that company has been fully proved and filed with the court by the United States attorney for the middle district of Alabama, who writes that the interests of the United States are fully protected, and that the Government will probably realize the full amount of its claim.

A sale of that portion of the road lying in the State of Georgia was ordered by the State court to take place July 7, 1874. It has, however, been postponed to September 1, 1874.

During the fiscal year I received from indebted railroad companies, in money and postal dues, the sum of $8,689.66, which has been deposited in the Treasury of the United States, and proper credit given in the accounts of the companies making payment.

TRANSPORTATION.

It is shown by reports of officers, so far as received, that the Quartermaster's Department transported by rail, water, wagon, and stage, during the fiscal year, 44,159 persons, 5,833 animals, and 198,409,236 pounds of material.

The following were the large movements of troops during the year:

The First Infantry, from the Military Division of the Atlantic to the Department of Dakota.

The Twenty-second Infantry, from the Department of Dakota to the Military Division of the Atlantic.

The Nineteenth Infantry, from the Department of the Gulf to the Department of the Missouri.

The Third Infantry, from the Department of the Missouri to the Department of the Gulf.

The Eighth Infantry, from the Department of the Platte to the Military Division of the Pacific.

The Twenty-third Infantry, from the Department of Arizona to the Department of the Platte.

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RAILROAD TRANSPORTATION.

The reports of officers show that 24,610 persons, 4,855 animals, and 91,099,331 pounds of material were carried by railroad.

Amount paid for railroad transportation, as reported by disbursing officers of this Department	$795,790 45
Amount of accounts for similar service rendered during the fiscal year referred by this Office to the Treasury Department for settlement	256,165 95
Total settlements for railroad transportation service during the year	1,051,956 40

Under the present system of transportation, the Department has, as a rule, secured the lowest practicable rates. In the transportation of detachments or large bodies of troops, and in shipments of large quantities of freight, special rates have generally been made, more favorable than the lowest tariff rates published by the railroad companies.

The following is a statement of the transportation-service performed by the Pacific Railroads for this Department during the fiscal year:

Names of companies.	Number of persons transported.	Number of animals transported.	Pounds of freight transported.
Union Pacific Railroad	5,823	1,442	18,723,652
Central Pacific Railroad of California	1,199	120	2,797,254
Kansas Pacific Railroad	1,176	179	2,116,139
Sioux City and Pacific Railroad	325	40	1,625,414
Total	8,523	1,781	25,262,459

The cost of service performed by the Pacific Railroads during the fiscal year, so far as accounts have been received at this Office, may be stated as follows:

Names of companies.	Amount of accounts referred to the Treasury for settlement.	Amount of accounts rendered and under examination July 1, 1874.	Total.
Union Pacific Railroad	$204,565 67	$32,316 34	$236,882 01
Central Pacific Railroad of California			
Kansas Pacific Railroad	47,716 62		47,716 62
Sioux City and Pacific Railroad	396 75		396 75
Total	252,679 04	32,316 34	284,995 38

At the date of this report all of the accounts for each month's service during the fiscal year have not been received at this Office; but taking as a basis the monthly average value of the accounts already presented for settlement, and where no accounts are presented, the amount of the accounts of the preceding year, and adding thereto the probable cost of the movement of troops made late in June, their total earnings during the year would be as follows:

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Union Pacific Railroad Company	$306,589 98
Central Pacific Railroad Company, (no accounts presented by this company for service during the year)	170,000 00
Kansas Pacific Railroad Company	98,978 16
Sioux City and Pacific Railroad Company	4,761 00
Total	580,329 14

Under act of Congress of March 3, 1873, chapter 226, section 2, no payments are made to these companies for the transportation of troops and military supplies; but, under decision of the Second Comptroller of the Treasury, the amounts so earned are to be taken from the appropriations of the Quartermaster's Department for Army transportation, and transferred to the honorable Secretary of the Treasury, to be credited to the companies on their respective accounts for interest due by them upon United States bonds issued in their behalf.

Congress, at various times since September 20, 1850, has made grants of public lands to aid in the construction of certain railroads, and attached certain conditions to said grants for the transportation of property or troops of the United States. A table of land-grant roads was published in General Orders No. 98, Adjutant-General's Office, 1872, giving the names of the roads and their termini, and the laws relating thereto, with brief extracts therefrom, as far as they relate to the subject of military transportation.

By an act entitled "An act making appropriations for the support of the Army for the fiscal year ending June 30, 1875," approved June 16, 1874, Congress enacted "that no part of the money appropriated by this act shall be paid to any railroad company for the transportation of any property or troops of the United States over any road which, in whole or in part, was constructed by the aid of a grant of public land, on the condition that such railroad should be 'a public highway for the use of the Government of the United States free from toll or other charge,' or upon any other conditions for the use of such road for such transportation;" and in the act making appropriations to supply deficiencies in the appropriations for the service of the Government for the fiscal years ending June 30, 1873 and 1874, approved June 20, 1874, Congress enacted "that no part of the sum appropriated by any provision of this act shall be paid to any railroad company which has received a grant of land on the condition that its road shall be 'a public highway for the transportation of the property and troops of the United States free from toll or other charge.'"

The law first mentioned, as construed by the Solicitor-General, in opinion approved by the Attorney-General, and published in General Orders No. 84, Adjutant General's Office, 1874, prohibits payment to all railroad companies that received grants of land on any condition whatsoever relating to military transportation. This embraces all those land-grant roads not constructed by aid of a grant of lands on condition that such railroads should be and remain public highways free from toll or other charge upon the transportation of property or troops of the United States, and which have heretofore received full compensation for such transportation, viz: the Atlantic and Pacific Railroad, from Springfield, Mo., to the Pacific Ocean; the Denver Pacific Railroad; the New Orleans, Baton Rouge and Vicksburg; the Northern Pacific; the Saint Joseph and Denver City; the Southern Pacific Railroad of California, and Branch Line; the Texas and Pacific and the Utah Central Railroads, with the exception of the Oregon Central Railroad.

The law last quoted does not prohibit payment out of the moneys

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therein appropriated for military transportation over the before-named roads.

To provide for the proper carrying out of these laws, the draft of a general order pertaining to the subject, and including a revised table of land-grant railroads, has been prepared in this Office and submitted to the Adjutant-General of the Army, with recommendation that it be published in general orders.

WAGON AND STAGE TRANSPORTATION.

There were transported by wagon during the year 37,720,900 pounds of military stores; and by stage 2,255 passengers, and 7,299 pounds of freight.

Amount paid for wagon-transportation, as reported by disbursing officers of this Department	$916,785 97
Amount of accounts for services rendered during the fiscal year, referred by this Office to the Treasury Department for settlement	3,910 00
Total for wagon-transportation service rendered during the year	920,695 97
Amount paid for stage-transportation, as reported by disbursing officers of this Department	57,645 25

Twenty-eight contracts for wagon-transportation were made during the year.

The successful award of the contract for wagon-transportation on what is known as "Route No. 2," for the period from the past to the coming spring, was delayed longer than desirable, causing, in consequence, some embarrassment. This route is for wagon-haul from most convenient points on the Atchison, Topeka and Santa Fé, Kansas Pacific, Denver and Rio Grande, and Missouri, Kansas and Texas Railroads to posts in the Department of Missouri and in the State of Texas north of the Red River and west of the ninety-seventh meridian, and Camp Apache, Arizona Territory.

Proposals were invited to cover the service from points on all the railroads named, but bidders were not restricted to bidding the same rates from all of the said railroads. The lowest bid received could not be accepted, for the reason that it was made on condition that all stores for posts in New Mexico and beyond should be sent over the Atchison, Topeka and Santa Fé Railroad. To enter into any such contract, restricting the Government to the use of any one road or route, was considered neither advantageous nor proper.

The bidder declined to enter into contract to haul from any other railroad at same rate, or to accept award for transportation of such stores only as might be sent over the Atchison, Topeka and Santa Fé Railroad. The contract was then awarded to the lowest bidder for the whole route, but he declined it, on the ground that, owing to the long delay in the award, he had gone into other business; and the next lowest bidder declined it for the same reason. The contract was then, on May 14, awarded to the lowest bidder next in order, who accepted it, at the rate of $1.05 per 100 pounds per one hundred miles. The previous contract expired March 31, 1874, and the service from that date to the time the existing contract was awarded and accepted was secured at rates reasonable under the circumstances.

Upon recommendation of the chief quartermaster, Department of the Missouri, the Quartermaster-General has directed that, hereafter, route No. 2 be divided, so that one contract shall be made for transportation from the termini of the railroads to the posts in Colorado, New Mexico, and Arizona, and another contract be made for the wagon-transporta-

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tion from the Atchison, Topeka and Santa Fé Railroad to Camp Supply, Indian Territory, also that, hereafter, these contracts be made to begin and end with each fiscal year, instead of beginning April 1 and ending March 31, as heretofore.

The rapid construction, within a few years past, of railroads toward and into Texas, by different routes, has changed materially the method of supplying certain of the posts in that State. Formerly stores not produced in the State were sent by the Gulf to Indianola and Galveston, thence by short rail-routes and long wagon-haul to destination.

Now supplies from the Mississippi Valley and the east are carried by rail within short haul of those posts. At the letting of the wagon-transportation contracts in the Department of Texas for the current fiscal year, exceedingly low rates were offered by the railroad companies in competition.

Proposals were also offered for through transportation to points in Texas from Chicago, Saint Louis, Jeffersonville, Leavenworth, and even from New York.

It was considered by the War Department that to accept any one of these through proposals would be to tie up the Department to one price for the whole year in a fluctuating market; to place the transportation of stores required to pass over many railroads in the hands of one or two contractors; to involve the Department in a contract providing for the payment of money, proportions of which would, in all probability, be paid into the hands of land-grant railroads on the route, in violation of the law of Congress prohibiting any payments to such railroads for the transportation of military supplies. Therefore, it was directed that the contracts should be limited to the transportation by wagon from the several railroad depots or stations which might be considered the most advantageous initial-points for such wagon-transportation in Texas; and further, for the transportation by sea from New Orleans to the coast of Texas of such supplies as might be sent over that route.

It was also directed that no contract should be made for the transportation of freight by rail from Saint Louis, Chicago, and other northern depots to points in Texas; but that officers who make the shipments from those cities and depots should take advantage of the best rates attainable at the time of shipment, and not be confined to any one route or a fixed rate.

The contracts recently made for wagon-service on the plains show, generally, a marked diminution in prices to be paid for such service, as compared with previous years, which, in connection with the advance of railroads, materially reduces the cost of supplying the remote military posts.

WATER-TRANSPORTATION.

There were carried by water for the Department during the fiscal year, 17,294 persons, 978 animals, and 69,581,706 pounds of material.

The amount paid on account of this service by disbursing officers during the year, so far as reported, was	$522,978 13
Accounts and claims for similar service rendered during the fiscal year, audited in this Office, and referred to the Treasury for settlement, amounted to	4,857 62
Total	527,835 75

The following-named vessels, owned by the War Department, have been in service of the Quartermaster's Department during the fiscal year, viz: Steam-tug General A. A. Humphreys, employed at Boston; propeller General McPherson, employed at San Francisco; schooner Mar-

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garet, employed at Portland, Oreg.; steam-launch Pulaski, employed at Fort Pulaski, Georgia, and *en route* to Fort Monroe, Virginia; steam-launch General Greene, employed at Fort McHenry, Maryland; schooner Matchless, employed at Key West and Fort Jefferson, Florida. The cost during the year of running and maintaining these vessels was $38,160.74.

Vessels of different kinds have at various times, as the necessities of the service required, been employed by charter or otherwise during the year, at an expense of $24,262.50, which, together with cost of running and maintaining vessels owned by the United States, is included in the amount hereinbefore reported as having been paid on account of water-transportation by disbursing officers of this Department.

STEAM-LAUNCHES.

Under authority granted by Secretary of War, the Quartermaster-General has had constructed or purchased a number of steam-launches for use of forts along the coast.

In March, 1874, a steam-launch was purchased by the Quartermaster's Department from Mr. A. L. Archambault, Kensington Iron Works, Philadelphia, Pa., for the sum of $5,250, and is now employed at Fort McHenry, Maryland, in carrying the mail, passengers, and military supplies, making three trips daily between the fort and Baltimore City, a distance of two and one-half miles. This launch, named the General Greene, after General Nathaniel Greene, who was Quartermaster-General from 1778 to 1780, is 50 feet long over all, 12 feet beam, 4 feet hold, engine-cylinder 9 by 10 inches, with horizontal tubular boiler, and has a small cabin, capable of seating comfortably ten or fifteen persons. It is reported that this launch makes the above-mentioned trip in between fifteen and twenty minutes, with a pressure of from 35 to 50 pounds of steam, and that the amount of coal consumed is less than 500 pounds per day. The crew consists of four enlisted men. The total cost of running this launch is estimated at $2.50 per day.

A steam-launch, named the General Jesup, after General Thomas S. Jesup, who was Quartermaster-General from 1818 to 1860, constructed by the New York Safety Steam-Power Company, of New York, was purchased in June, 1874, for $5,000, and dispatched to Fort Adams, Rhode Island, for service between the fort and Newport, R. I. This launch is 56 feet in length, 10 feet beam, 4 feet 8 inches depth of hold, and has a vertical boiler 50 inches in diameter; shell of steel, with plates $\frac{3}{8}$ inch in thickness. Twelve persons can be seated comfortably in its cabin. The hull is of oak, and copper-fastened throughout.

On a trial-trip the launch easily steamed about ten miles per hour with a pressure of 90 pounds, and the trip from New York to Fort Adams, a distance of about one hundred and thirty-five nautical miles, was made at an average speed of seven and one-half nautical miles per hour.

Instructions have been given for the construction by and purchase from the New York Safety Steam-Power Company of two more launches, one for the use of the garrison at Fort Hamilton, New York Harbor, and the other for use of the garrisons of the forts in Boston Harbor.

The steam-launch Pulaski, built in February, 1872, by Messrs. Pusey, Jones & Co., of Wilmington, Del., and purchased by the Quartermaster's Department to run between Fort Pulaski and Savannah, Ga., rendered good service at that post from April, 1872, until the abandonment of the post in October, 1873. After repairs at Charleston, S. C., the launch was transferred to Fortress Monroe, Virginia, and is now in use at that post.

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TRANSPORTATION APPROPRIATION AND ITS DISBURSEMENT.

The amount appropriated for the fiscal year 1873–'74 was $4,500,000.

Recapitulation of expenditures made from appropriation for Army-transportation up to July 1, 1874, for transportation-service rendered during the fiscal year 1873–'74.

Kind of transportation.	Passengers.	Freight.	Expenditures.	Total.
For railroad-transportation	$504,227 08	$542,969 61	$4,759 71	$1,051,956 40
For water-transportation, including expenses of running and maintaining Government vessels	134,700 84	353,947 67	39,187 24	527,835 75
For wagon-transportation	.....	810,558 51	110,137 46	920,695 97
For stage-transportation	55,481 71	2,163 54	.....	57,645 25
Total	694,409 63	1,709,639 33	154,084 41	2,558,133 37
For purchase of transportation-animals; for purchase and repairing of Army and spring wagons, carts, harness, &c.; for hire of teamsters; for pumps and other apparatus to supply posts with water; for building and repairing wharves; for digging wells; for telegrams; for purchase of steam-launches; and for tolls—estimated				817,273 03
Grand total				3,375,406 40

Amount of appropriation remaining in the Treasury June 30, 1874, $1,124,593.60.

To make settlement for transportation service rendered by Pacific Railroads during the year, the cost of which is estimated to amount to about $580,000, and also to make payment on other accounts chargeable to this appropriation, will, it is thought, absorb about all of the balance in the Treasury June 30.

TRANSPORTATION ACCOUNTS OF PREVIOUS FISCAL YEARS.

During the fiscal year accounts and claims for transportation service performed during previous fiscal years were referred by this Office to the Treasury for settlement as follows:

For railroad-transportation	$331,835 17
For water-transportation	104,808 68
For wagon-transportation	144,229 63
For stage-transportation	6,252 23
For miscellaneous transportation-claims, tolls, and telegrams	187,926 97
Total	775,052 68

MILITARY TELEGRAPH.

By act of Congress of March 3, 1873, (17 Stat., p. 528,) the sum of $50,311.80 was appropriated for the construction of a military telegraph from San Diego, Cal., via Fort Yuma and Maricopa Wells, to Prescott and Tucson, Ariz. The disbursement of this appropriation was committed to the officers of the Quartermaster's Department, and the line was completed under supervision of those officers and others, all acting under the general direction of the commanding officers of the Military Division of the Pacific, and the Department of Arizona. The money was not available until July 1, 1873, but preliminary steps were immediately taken to collect material on the line of the proposed telegraph. The reconnaissance commenced at Prescott June 28, 1873, and terminated at San Diego August 2, 1873. The work of construction commenced at San Diego August 28, 1873; at Prescott September 2, 1873; at Yuma September 20, 1873, and at Maricopa Wells October 11, 1873. The line was completed its entire length to Tucson, 540 miles, on Decem-

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ber 2, 1873—that is, in ninety-seven days. The labor of construction was performed by United States troops.

Accompanying this report will be found papers marked B and C, extract copy of reports made by Capt. George F. Price, Fifth Cavalry, in charge of construction, and R. R. Haines, superintendent of construction, forwarded to this Office by the chief quartermaster of the Military Division of the Pacific, and giving detailed information relative to the work of construction, location of line, &c.

From reports of officers, so far as received, the expenditure from the appropriation made by Congress for the construction of this telegraph-line was as follows:

Purchase of wire and other material	$24,530 99
Equipment, including instruments, books, blanks, and tools for repairing the line	3,584 73
Printing rules for regulating line	55 55
Services of civilians	7,375 38
Purchase of poles	9,252 00
Repairing line before opening	44 21
Total	44,842 86
Amount appropriated	50,311 80
Balance	5,468 94

Of which $5,086.51 is reported in the hands of officers, and the remainder, $382.43, it is believed, has been expended in constructing the line by officers whose reports of expenses have not yet reached this Office.

It is shown by reports of officers that from date of opening of line, November, 1873, to June 20, 1874, 5,134 messages, containing 176,657 words, have been sent by this telegraph.

The expenses of operating the line, including pay of operators, rent of offices, repairs and renewal of line, miscellaneous office-expenses, delivery of messages, &c., have amounted to $7,102.81, or an average of $906.74 per month.

The revenue derived from private messages and news reports has amounted to $5,930.78, or an average of $757.12 per month.

Stations were established along the line at the following places, viz, San Diego, Cal.; National City, Cal.; Mountain Springs, Cal.; Yuma Depot, A. T.; Stanwix Station, A. T.; Maricopa Wells, A. T.; Camp Whipple, A. T., and Tucson, A. T.

In return for a liberal donation of poles by the citizens of Florence the wire was run to that town, and permission given to open an office there on the commission basis; but so far as this Office is advised, no steps have yet been taken to open the office at that point. This Office has been recently informed that the station at National City has been closed, and that the station established at Mountain Springs has been removed to Indian Wells.

By an act entitled "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1875, and for other purposes," Congress appropriated $4,000, to enable the Secretary of War to extend the line of military telegraph from Prescott to Camp Verde and Camp Apache, in Arizona. Congress, by the same act, authorized the money received for dispatches sent over the said lines to be used to pay the expenses of operating and keeping the lines in order, and also enacted "that the Chief Signal-Officer of the Army shall have the charge and control of said lines of telegraph in the construction, repair, and operation of the same."

The Chief Signal-Officer has not yet assumed entire control of the constructed lines.

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BARRACKS AND QUARTERS.

MILITARY BUILDINGS.

During the year the construction of 140 new buildings has been authorized. They include barracks, officers' quarters, stables, store-houses, guard-houses, &c. They are at military posts in the States of Alabama, Florida, Kansas, Massachusetts, Missouri, Nebraska, South Carolina, Virginia, California, Georgia, Louisiana, Maryland, Minnesota, North Carolina, Tennessee, Connecticut, Kentucky, Oregon, Michigan, New York, Rhode Island, Texas, and the Territories of Dakota, New Mexico, Utah, Washington, Wyoming, Indian, Arizona, Montana. Their estimated cost was $313,233.

WHARVES.

Authority has been given for the construction and repair of wharves to the amount of $14,797.

REPAIRS.

Upon special estimates submitted to the Secretary of War, authority has been given to make repairs, alterations, &c., of public buildings, and for the construction and repair of cisterns, &c., at the various military posts to the amount of $218,066.

NEW POSTS.

In the annual report relative to barracks and quarters for the fiscal year ending June 30, 1873, it was reported that two new four-company posts had been authorized during that year in Arizona; one at or near Tucson, and one near the mouth of the San Carlos River, at a cost for both of not over $35.000; troops to furnish the labor. The former is now known as Camp Lowell; the latter as Camp Grant. The Secretary subsequently increased the allotment to $50,000. It was also stated in the same annual report that the Secretary of War had also authorized a remittance of $20,000 for shelter of men and officers at Tulerosa, New Mexico.

From reports received, it appears that the sum of about $5,000 was expended in erecting additional structures and in repairing existing buildings at that post; and the Secretary subsequently authorized, from the $20,000 fund, a transfer of $6,000 for completion of buildings at Fort Bayard, N. M., and $9,000 for construction of a new post at Horse Creek, eighteen miles from Tulerosa.

The building operations at Camp Tulerosa were suspended on account of the removal by the Interior Department of the Indians from the reservation upon which the proposed post was to be located.

Congress, in the act making appropriations for support of the Army for fiscal year of 1873–'74, approved March 3, 1873, authorized the establishment of two new posts between the Missouri River and Fort Ellis, but made no specific appropriation for these two particular posts, their cost being included in the general appropriation of $1,700,000 for that year for barracks and quarters. Under that authority the Secretary of War authorized the necessary accommodations for a new six-company cavalry post at Fort Abraham Lincoln, and approved plans of buildings, the estimated cost of which was reported at $90,903.46. The buildings proposed were as follows: 3 two-company barracks, with

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kitchens and wash-rooms; 7 stables; 1 building for laundress's quarters; guard-house; granary; subsistence store-house, with cellar and office-room; 1 quartermaster's store-house, with office-room; 3 buildings for officers' quarters; 1 building for commanding officers' quarters, making a total of 22 buildings, the estimated cost of which was $94,003.39. This being in excess of the sum allowed, it was decided to take no action in regard to the quartermaster's store-house, whose cost was estimated at $3,099.93, until the other work had so far progressed as to determine whether or not such a building could be erected without carrying the total cost beyond the amount authorized.

The department quartermaster reported December 20, 1873, that all of the buildings, including the store-house and a hospital-building, were completed according to the plans, with exception of the guard-house, laundress's quarters, and dispensary not plastered; and that the total amount expended and reported up to December 20, on account of the aforesaid buildings, was $73,033.03; and further, that although there was a small amount still due not yet reported, such amount, and the cost of completing the plastering, would not carry the total cost beyond $74,000, or $16,000 less than the amount authorized.

No definite action, so far as known to this Office, has been taken in regard to the other new post authorized by Congress in the act referred to.

Recapitulation of the expenditures specially authorized for construction of new buildings at established posts; construction and repair of cisterns; miscellaneous repairs to buildings; construction of new posts, and how distributed.

Department of Dakota	$144,316
Department of Arizona	64,939
Department of the Platte	150,827
Department of the East	47,429
Department of the South	33,662
Department of Texas	84,549
Department of the Gulf	5,966
Department of the Missouri	50,258
Department of the Columbia	47,490
Department of California	22,563
Total	651,999

Of this sum, constructions, repairs, &c., to the amount of $43,370, though approved by the War Department during the fiscal year, were not to be commenced, nor any expenditure incurred therefor, until after July 1, 1874, when the new appropriation became available.

HOSPITALS.

During the fiscal year constructions, repairs to, and alterations of military-hospital buildings throughout the country have been authorized by the Secretary of War at a cost of $85,077.

Work to the amount of $9,500, though approved during the year, and included in the $85,077, was not to be commenced, nor any expenditure incurred, until the beginning of the new year.

The following list gives the locality of the hospitals and the amount of expenditure authorized at each:

Adams, Fort, R. I	$1,900
Angel Island, Cal	300
Bridger, Fort, Wyo	360
Barrancas, Fort, Fla	500
Baton Rouge Barracks, La	800
Brady, Fort, Mich	2,750

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Columbus, Fort, New York Harbor	3,716
Clark, Fort, Texas	12,000
Concho, Fort, Texas	187
Dodge, Fort, Kans	1,172
Disappointment, Fort Cape, Wash	328
Davis, Fort, Texas	7,900
Foote, Fort, Md	646
Griffin, Fort, Texas	500
Hamilton, Fort, New York Harbor	500
Independence, Camp, Cal	2,125
Jackson Barracks, La	3,235
Klamath, Fort, Oreg	5,250
Lincoln, Fort A., Dak	500
Leavenworth, Fort, Kans	1,914
Larned, Fort, Kans	360
Laramie, Fort, Wyo	5,000
McDowell, Camp, Ariz	5,440
McPherson, Fort, Nebr	385
McHenry, Fort, Md	865
Monroe, Fort, Va	5,835
Mackinac, Fort, Mich	300
Newport Barracks, Ky	1,000
Niagara, Fort, N. Y	92
Ontario, Fort, N. Y	50
Omaha Barracks, Nebr	700
Plattsburgh Barracks, N. Y	90
Pembina, Fort, Dak	489
Preble, Fort, Me	343
Porter, Fort, N. Y	542
Randall, Fort, Dak	30
Supply, Camp, I. T	200
Sanders, Fort, Wyo	325
Steele, Fort Fred, Wyo	7,000
Snelling, Fort, Minn	4,000
Trumbull, Fort, Conn	491
Wood, Fort, New York Harbor	150
Wadsworth, Fort, New York Harbor	340
Willet's Point, N. Y	35
Wingate, Fort, N. Mex	483
Wallace, Fort, Kans	793
Wayne, Fort, Mich	1,700
Total	85 077

The appropriation for construction and repair of hospitals was $100,000.

At the close of the fiscal year there remained in the Treasury to the credit of the appropriation for hospitals for 1873–'74, $1,428.06.

PISÉ BUILDINGS.

During the fiscal year of 1872–'73, a short tract on construction in pisé, extracted from Creecy's Dictionary of Civil Engineering, was published and distributed to officers of the Army.

It is reported that during the past fiscal year nine buildings, consisting of officers' quarters, stables, &c., were constructed in pisé at Camp Verde, Arizona, and that the walls are found to be admirably solid.

The following is an extract from the annual report of Maj. J. J. Dana, quartermaster, U. S. A., for the fiscal year ending June 30, 1874:

Experiments in the construction of pisé walls were made under my direction, and resulted so favorably as to cause them to be adopted on my recommendation for the buildings authorized by the War Department to be constructed at Camp Verde, enabling us to shelter one more company of infantry at that post, with sundry other buildings in excess of the number first contemplated in the estimate originally furnished, and yet within the sum authorized for a smaller number of buildings

The walls of the building were one foot thick; the layer of earth one foot high. To facilitate removal, the two planks forming the sides of the mold or box were connected by four iron rods, two at each end, with beads and nuts. But little wetting was found

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requisite for the preparation of the earth used, which was such as is used for making adobes.

Good, thorough ramming seemed to be the principal thing to be observed. These walls could be constructed with great ease and rapidity by one skilled mason or mechanic, assisted by two or three soldiers, and at a cost of about one-third less than that of adobes. The walls were admirably solid, and when covered with an exterior coat of lime, mortar, or, preferably, hydraulic cement, are sufficient for the ordinary requirements of a country like Arizona.

Referring to the subject of construction in pisé, called up by the foregoing extract from Major Dana's report, the Quartermaster-General remarks, August 25, 1874:

It is believed that it will generally be found that the greater stability of walls 20 inches in thickness, as used in France, will be more than compensation for the additional labor.

For interior or partition walls, not carrying floor-beams, one foot will be generally sufficient.

DEPOT-BUILDINGS PROPOSED AT SAN ANTONIO, TEX.

The appropriation of $100,000 made by Congress for the construction of depot buildings at San Antonio, Tex., has not been drawn out of the Treasury. The Secretary of War, on March 24, 1873, directed the Quartermaster-General "to allow no action to be taken by any officer of the Quartermaster's Department looking to the erection of these depot-buildings until further instructions."

JEFFERSONVILLE DEPOT.

The fire-proof buildings and appurtenances at this depot, authorized by law, (the site having been given to the United States,) being now complete, or nearly so, steps have been taken with a view of planting, &c., the court-yard thereat.

A design for beautifying these grounds has been adopted, and instructions given to have the work done as funds, from time to time, can be spared for the purpose.

BUILDINGS AUTHORIZED TO BE SOLD.

The sale of fourteen buildings, old store-houses, stables, &c., of various dimensions, together with refuse material, at different places throughout the country, has been authorized.

BUILDINGS AND LANDS TRANSFERRED TO AND FROM THE QUARTERMASTER'S DEPARTMENT.

By letter of June 26, 1873, the Secretary of War approved a request of the division commander, that Charleston Arsenal, Charleston, S. C., be turned over to the Quartermaster's Department for occupancy as a garrison-post. The station is now known as "Charleston Barracks."

By letter of August 23, 1873, the Secretary of War advised the division commander that "the Secretary of the Interior has turned over Fort Walla Walla to the War Department, to be retained as long as it may be required for military purposes."

The Government buildings at Fort Brooke, Florida, were, on February 16, 1874, turned over to the custody of the Treasury Department until further orders.

Two buildings at Fort Pulaski, Georgia, were, on February 6, 1874, transferred to the custody of the Engineer Department.

The site of Camp Hualpai, Arizona, was turned over to the Interior Department April 22, 1874.

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MILITARY SITES IN TEXAS.

The unsatisfactory tenure by which the United States holds the sites of military posts in Texas has heretofore been set forth in previous annual reports of this Office.

Congress, March 3, 1873, (17 Statutes, page 614,) authorized purchase of the sites needed at a fair price, upon certain conditions set forth in the act.

The board of officers convened in pursuance of said act have made reports and recommendations relative to purchase of sites at the following posts, and at the prices stated, viz:

Fort Brown	$25,000
Fort Clark	7,000
Fort Concho	6,400
Fort Davis	9,000
Fort Duncan	10,920
Fort Griffin	4,200
Fort McIntosh	3,000
Fort McKavit	15,000
Fort Quitman	3,840
Fort Stockton	12,000
Ringgold Barracks	10,000
Total	106,360

The reports of the board having been approved by the commanders of the Department of Texas and Military Division of the Missouri, as also by the Secretary of War and the President, were transmitted by the Secretary of War to Congress in communication of May 20, 1874, (Ex. Doc. 280, House of Representatives, 43d Congress, 1st session,) with recommendation that the necessary appropriation be made for the purchase of the sites. Congress has not taken final action in the matter.

ARTESIAN WELLS.

By act of Congress of June 8, 1872, the Secretary of War was authorized to expend $10,000, or so much thereof as might be necessary, in boring for water at Fort D. A. Russell, near Cheyenne Depot, Wyoming Territory. A well was commenced November 27, 1872, but after boring 410 feet through drift, the work was abandoned March 16, 1873, on account of the tubing having been injured. In attempting to draw the tubing out it broke, leaving a portion in the well. It was considered cheaper to bore a new well than to attempt to sink the old one deeper.

The amount expended on the first well to date of its abandonment was $8,195.38. A second well was commenced March 22, 1873, with the following results:

Strata.	Depth of each stratum.	Date.
	Feet.	
Gravel, clay, and sand	75	March 31, 1873
Soapstone	20	April 1, 1873
Soapstone and mixture of fine gravel	65	April 4, 1873
Gravel and mixture of clay	50	April 5, 1873
Red shale	190	May 8, 1873
Red shale with some gravel	20	May 10, 1873
Granite	10	May 12, 1873
S apstone	20	May 13, 1873
Soapstone, very soft	62	May 15, 1873

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Strata.	Depth of each stratum.	Date.
	Feet.	
Gravel and quicksand	28	June 13, 1873
White indurated clay	18	July 30, 1873
Quicksand	7	Aug. 5, 1873
White indurated clay	15	Aug. 15, 1873
Clay, a little harder	35	Aug. 19, 1873
Clay	52	Aug. 21, 1873
Blue clay	3	Aug. 23, 1873
Black clay	5	Aug. 23, 1873
Blue clay	18	Sept. 9, 1873
Clay	7	Sept. 13, 1873
Blue clay	240	Nov. 4, 1873
Blue clay, with mixture of sharp sand	20	Nov. 6, 1873
Clay	230	Feb. 14, 1874
Clay, hard	22	Feb. 17, 1874
Rock	3	Feb. 18, 1874
Sand-rock	5	Feb. 20, 1874
Slate	161	March 28, 1874
Total	1,381	

In addition to the $10,000 authorized by Congress, the Secretary of War, May 20, 1873, authorized an expenditure of $3,000.

In submitting a request for $1,360, dated September 17, 1873, the Quartermaster-General recommended that the boring be continued through the clay in which the well then ended, and that the necessary funds be set apart for that purpose. The Secretary, on October 13, 1873, approved the recommendation, and the work was resumed.

On April 11, 1874, the Lieutenant-General reported that a further expenditure was necessary to carry on the work, and asked instructions whether to continue it or not.

On April 16, 1874, the Secretary advised the Lieutenant-General that he was willing to permit an additional expenditure of $5,000 in hopes of a successful result. No special remittance for this purpose was made, however, as the work, owing to difficulty in a soft stratum underlying the rock penetrated, was stopped before the money had been remitted. This stoppage was ordered on April 23, 1874, by telegraph from the Secretary to the Lieutenant-General.

The tools used at the Fort Russell well are on hand, and will be available should it be desired at any time to sink artesian wells in other districts where they are known to succeed.

Requests have been made for such a well at Omaha Barracks, but as yet no satisfactory report of probability of success has been received at this Office. The well and machinery at Fort Russell are now covered in and all made secure.

DRIVE-WELLS.

The assistant quartermaster at Camp Supply, Indian Territory, reports that during the past year he has had two wells, with 1½-inch pipe, driven, one at the cavalry stables, the other at the northwest set of company quarters, and remarks, "They are a perfect success." He reports that he finds pipe of the size stated drives easier, forms a good reservoir for water, and is as serviceable as the 3-inch pipe if good pumps are furnished. Another well was commenced at same post by same officer, and at last report had been driven to the depth of 20 feet. It is expected that a good supply of water would be found at about 26 feet.

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POST CEMETERIES.

Authority has been granted by the Secretary of War, and instructions given by this office during the fiscal year, for erecting head-boards and inclosing the post cemetery at Fort Clinch, Fla.; for repair of fence and planting of trees at Fort McHenry, Maryland, cemetery; for removal of one soldier's remains in Mississippi City to national cemetery at Chalmette, La.; also of removal, in the fall, when cold weather has returned, of the remains of thirty soldiers and one officer from Fort Mason (Texas) cemetry to the national cemetry at San Antonio, Tex.

Under date of October 14, 1873, the Secretary directed that interments at Fort Columbus, on Governor's Island, New York Harbor, be discontinued; but that the remains of the dead now there be not disturbed, and that the cemetery be protected and decorated with trees, shrubs, and flowers.

The remains of soldiers who may hereafter die at that post are to be interred in the Cypress Hill Cemetery.

The Secretary of War has directed that "where the remains of Union soldiers are buried in local cemeteries, they will not be removed at the expense of the Government. In exceptional cases, where soldiers are necessarily buried in private grounds, and the graves are likely to be disturbed, the remains may be removed to the nearest national cemetery."

POSTS ABANDONED.

During the year the War Department authorized the abandonment of Camp Bowie, Arizona Territory; Camp Warner, Oregon.

FIRES.

Six fires have been reported during the fiscal year.

August 3, 1873, four of the cavalry stables at Fort Riley, Kans., were destroyed.

February 1, 1874, the store-house on Pier 51, North River, New York, was destroyed.

February 6, 1874, the commanding officer's quarters at Fort Abraham Lincoln, Dak., were destroyed.

March 9, 1874, one building, used as officers' quarters, at Fort Gratiot, Mich., was destroyed.

April 27, 1874, hospital and company quarters at Alcatraz Island, Cal., were destroyed.

June 27th, 1874, certain portion of the transportation correl at Fort Union, N. M., was destroyed.

RESERVATIONS.

Three reservations have been declared during the past year, by the President, viz: Pike's Peak, Colo., December 23, 1873; Fort Seward, Dak., November 25, 1873; Sidney Barracks, Nebraska, May 14, 1874.

APPROPRIATION FOR BARRACKS AND QUARTERS.

The amount of the appropriation for barracks and quarters for 1873–'74 was $1,700,000.

Information of the remittances made, and their classification, will be found in annual report of the finance branch of this Office.

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At the close of the fiscal year $52,862.65 of the appropriation for barracks and quarters for 1873–'74 remained undrawn at the Treasury. This fund, as also funds in the hands of officers, will all, it is thought, be entirely absorbed in payment of outstanding indebtedness for materials, rents, hire of mechanics, &c., properly chargeable to this appropriation. It is believed, however, no deficiency estimate will be necessary.

REGULAR AND MISCELLANEOUS SUPPLIES.

The issue of forage and straw during the fiscal year was as follows: Corn, 710.005 bushels; barley, 179,283 bushels; hay, 50,925 tons; straw, 3,206 tons; oats, 990,497 bushels; bran, 51,078 bushels; fodder, 58 tons.

The issues of fuel during the same period were: Wood, 136,047 cords; anthracite coal, 18,110 tons; bituminous coal, 20,211 tons.

ANIMALS.

In addition to the necessary purchases from time to time, to meet special cases, the Secretary of War authorized, early last spring, a general remount of the several cavalry regiments and companies of light artillery, and funds were remitted to the proper officers with which to make the purchase of 2,000 horses, to be distributed as follows:

First and Fifth Cavalry, 480; Fourth Cavalry, 100; Eighth Cavalry, 275; First Artillery, 12; Fourth Artillery, 12; Second Cavalry, 123; Sixth Cavalry, 200; Ninth Cavalry, 100; Second Artillery, 000; Fifth Artillery, 12; Third Cavalry, 227; Seventh Cavalry, 300; Tenth Cavalry, 150; Third Artillery, 9. It was decided that the horses should be purchased in same manner as the remount of the previous year, viz, by a board of officers to move from place to place, proper notice being given, and buy direct from farmers and stock-raisers the best horses presented in lots from one upward.

The following statements show the number of horses and mules purchased in the several military departments during the fiscal year; also, their total cost, and average cost:

Cavalry and artillery horses.

Where purchased.	Number.	Total cost.	Average cost.
Department of the East	2	$375 00	$187 50
Department of Texas	765	75,545 27	98 75
Department of the Missouri	229	26,692 44	125 29
Department of the Platte	438	52,838 93	120 63
Department of Dakota	343	43,392 93	126 51
Department of California	49	6,843 00	139 65
Department of Columbia	120	13,497 00	112 47
Depot of Washington	21	4,550 00	216 66
Total	1,967	223,734 57	113 74

The amount appropriated for purchase of cavalry and artillery horses for the fiscal year was $350,000.

In addition to the sum expended as above reported, the larger part of the remainder of the appropriation will probably be absorbed in payment for horses contracted for by the several boards, but not delivered up to close of fiscal year. The money not expended will be turned into the Treasury.

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MULES.

Where purchased.	No.	Total cost.	Average cost.
Department of the East	3	$652 50	$217 50
Department of Texas	5	770 00	154 00
Department of Dakota	16	2,400 00	150 00
Department of California	181	24,054 00	132 89
Department of the Columbia	32	3,681 00	115 03
Depot of Washington	6	1,244 22	207 37
Total	243	32,801 72	134 98

The following is a tabular statement of the sales of public animals in the different departments, showing number sold and amount realized:

Departments.	Horses.		Mules.		Oxen.		Total.	
	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.
Department of the East	18	$858 05	2	$199 00	.....	.....	20	$1,057 05
Department of the South	60	3,428 03	16	929 20	.....	.....	76	4,357 23
Department of the Gulf	1	70 00	2	117 50	.....	.....	3	187 50
Department of Texas	377	12,407 55	70	2,134 65	18	$348 75	465	14,890 95
Department of the Missouri	160	7,874 53	193	10,929 23	.....	.....	353	18,803 76
Department of the Platte	133	6,945 44	15	1,025 50	.....	.....	148	7,970 94
Department of Dakota	93	5,365 88	19	1,393 00	5	144 00	117	6,902 88
Department of California	27	718 00	24	550 00	.....	.....	51	1,268 00
Department of Arizona	19	717 00	6	217 00	.....	.....	25	934 00
Department of the Columbia	112	3,674 80	17	493 50	12	255 70	141	4,424 00
Depot of Washington	9	732 50	.....	.....	.....	.....	9	732 50
Depot of Jeffersonville	24	1,639 00	2	80 00	.....	.....	26	1,719 00
Total	1,033	44,430 78	366	18,068 58	35	748 45	1,434	63,247 81

SUMMARY.

The following is a summary statement of the number of animals purchased, sold, died, &c., and remaining on hand during the fiscal year:

On hand, purchased, &c.	Horses.	Mules.	Oxen.
On hand July 1, 1873	10,130	10,425	110
Purchased	1,967	243	.....
Taken up, &c	244	91	.....
To be accounted for	12,341	10,759	110
Sold	1,033	366	35
Died	482	536	9
Lost and stolen	207	280	1
Total sold, died, &c	1,722	1,182	45
On hand June 30, 1874	10,619	9,577	65

CONTRACTS.

There were filed and examined in this Office, during the fiscal year, 676 contracts, as follows: 215 for forage, embracing 21,144,553 pounds of oats, 22,787,633 pounds of corn, 2,734,340 pounds of barley, 37,000 pounds of bran, 25,954 tons of hay; 53 for forage as required; 69 for both forage and fuel; 15 for 2,090 tons of straw; 30 for 31,015 tons of coal; 4 for coal as required; 103 for 114,922 cords of wood; 27 for wood as required; 25 for 42,825 bushels of charcoal; 3 for the construction or

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quarters; 50 for transportation; 6 for miscellaneous services; 1 for army wagons; 13 for clothing, camp and garrison equipage; 26 for national cemeteries; 4 for stationery; 1 for construction of steam-launch; 31 leases.

ESTIMATES AND REQUISITIONS.

Estimates for annual supplies and miscellaneous estimates and requisitions have been received and acted upon during the fiscal year, as follows:

From Military Division of the Pacific	25
From Military Division of the Missouri	147
From Military Division of the South	99
From Military Division of the Atlantic	76
From depot of Washington	26
From Military Academy at West Point	10
From miscellaneous sources	5
Total	388

WAGONS AND HARNESS.

Three hundred and nine Army-wagons have been purchased during the present fiscal year. Three hundred of these were provided under a contract authorized during the previous fiscal year, and have not been entirely distributed to the various military departments. Applications have been received, from time to time, for supply of styles of Army-wagons other than the regulation pattern, but the purchase of such has uniformly been denied by the Secretary of War.

The stock of harness in store at depots is about exhausted, and it is purposed to have a supply purchased, under contract, to be kept on hand to meet sudden requirements, and to replace old harness now in use, and which is rapidly becoming totally unserviceable. Very little harness has been bought within eight or nine years past, it having been the policy of the Department to purchase none so long as the stock left on hand at the close of the war could be repaired and made to answer requirements.

The purchase of seven spring wagons for various posts and stations was authorized during the year.

The following is a statement of wagons, ambulances, and harness on hand in the Quartermaster's Department, as shown by the last returns of officers received at this Office:

Army-wagons	2,385
Spring-wagons	259
Ambulances	159
Wagon-harness	20,149
Ambulance-harness	1,934

PAYMASTERS' SAFES.

In conformity with an act of Congress, approved March 3, 1873, the transfer of 128 paymasters' safes, on hand at the depots of Jeffersonville and Philadelphia, was directed in January, 1874.

INCREASE OF FUEL ALLOWANCE.

During the winter of 1873–74, and in fact for several years past, frequent complaints were made of the insufficient allowance of fuel during the cold season at certain posts, and especially at stations in the north-

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ern latitudes and on the lakes, and numerous applications for increase of the allowance were received.

To provide for cases in which the unusual severity of the weather rendered an increase actually necessary for the comfort of the officers and troops, the acting quartermaster-general recommended to the Secretary of War that a certain increase, depending upon a certain thermometrical record at stations, be authorized. General Order No. 18, War Department, Adjutant-General's Office, 1874, regulates the issue accordingly.

OFFICIAL SEALS.

In order to prevent and detect any tampering with boxes, bales, or packages containing quartermasters' stores, while in the hands of carriers or in warehouses, a stamp has been furnished to the officers of the Quartermaster's Department, at each post or station, with which to seal with an impression in wax, showing the name of the particular station, the packages shipped or stored, in such a manner that they cannot be opened without breaking the seal.

Instructions as to the method of placing the seal on boxes and bales, as also in regard to weighing and marking packages, are published in General Order No. 37, War Department, Adjutant-General's Office, series of 1874.

PADLOCKS.

In October, 1873, the Quartermaster-General directed the adoption, for the general use of the Quartermaster's Department, of the padlock known as the Scandinavian, or jail, on account of its superior strength and its durability. One thousand one hundred and twenty-two of these padlocks have since been supplied to the various posts and stations of the Army.

JOHNSON'S HAND FORCE-PUMPS.

Upon the recommendation of the Quartermaster-General, the Secretary of War has authorized the adoption of these pumps, to form a part of the fire-extinguishing apparatus to be kept at posts and stations.

The result of several comparative trials, made under direction of the Quartermaster-General, of this pump with each, the Babcock and champion chemical fire-extinguisher, proved that quite as much could be accomplished by this simple and cheap machine in extinguishing fire, as by the more intricate and costly chemical fire-extinguishers. The cost of the Johnson pump is about one-sixth that of the chemical extinguisher. Two hundred and fourteen of these pumps have been supplied to various stations.

EXPLORING EXPEDITIONS.

The Secretary of War having directed that the assistance extended by the Quartermaster's Department to the surveying expedition under charge of Lieutenant Wheeler, of the Engineer Corps, for the season of 1873, be renewed, so far as needed, for the season of 1874, the necessary instructions were given to the proper officers of the Quartermaster's Department for the aid and outfit of the expedition.

These instructions contemplated the loan of certain means of transportation, to be returned at the close of the season—all deficiencies to be made good—the transportation of the civilian employés, instruments, materials, and collections of the survey, and the sale at cost prices to the party of such clothing, equipage, forage, and other stores as might be needed and could be spared from the various posts and stations on the route of the survey, without detriment to the military service.

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IRON-HUBBED WHEELS.

The result of the trials of iron-hub wheels, to which reference was made in the last annual report, has not as yet been fully reported to this Office, but information thus far received indicates that the use of such wheels in dry climates will prove advantageous.

APPROPRIATION FOR REGULAR SUPPLIES.

The appropriation under this heading was $4,500,000.

Information as to the remittances made and their classification, will be found in the annual report of the finance branch of this Office.

At the close of the fiscal year the sum of $237,486.45 remained in the Treasury to the credit of the appropriation, which sum will be sufficient to meet all outstanding indebtedness, and no deficiency appropriation will be necessary.

CLAIMS AND ACCOUNTS.

By section 2 of the act making appropriations for the support of the Army for the fiscal year ending June 30, 1875, and for other purposes, Congress enacted that "the Quartermaster-General, Commissary-General, and Third Auditor of the Treasury shall continue to receive, examine, and consider the justice and validity of such claims as shall be brought before them under the act of July fourth, eighteen hundred and sixty-four, and the acts amendatory thereof; and the Secretary of the Treasury shall make report of each claim allowed by them, at the commencement of each session of Congress, to the Speaker of the House of Representatives, who shall lay the same before Congress for consideration."

By section 5 of the act making appropriations for legislative, executive, and judicial expenses of the Government for the year ending June 30, 1875, approved June 20, 1874, Congress also enacted that all unexpended balances of appropriations which have remained upon the books of the Treasury for two fiscal years, should, with certain exceptions, be carried to the surplus-fund and covered into the Treasury.

The law last referred to covers into the Treasury all appropriations out of which payment of claims under the act of July 4, 1864, and claims for rent and service prior to July 1, 1873, have hitherto been made. By the first act referred to Congress directs the Quartermaster-General to continue to receive, consider, and examine claims under act of July 4, 1864, but there is no law directing him to examine and report upon claims for occupation of land and houses for military purposes during the war, or for services.

A large number of such claims are on file in this Office.

The work of the branches of your Office under my charge was largely increased during the past year by the necessary examination and reference to the Treasury for settlement of the accounts, numbering about 6,000, pertaining to the outstanding indebtedness of the previous fiscal year, for payment of which Congress made a deficiency appropriation in June, 1874.

The following statements exhibit the number of transportation claims and accounts, and claims under act of July 4, 1864, and miscellaneous claims on hand July 1, 1873, received and acted upon during the year, and remaining on hand June 30, 1874:

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Statement of accounts and claims in the transportation division, Quartermaster-General's Office, for the fiscal year ending June 30, 1874.

	Number.	Amount.	Number.	Amount.
Number of accounts and claims on hand July 1, 1873	212	$613,393 72		
Number of accounts received during the fiscal year	885	767,876 34		
Number of claims received during the fiscal year	448	897,008 80		
Total number of accounts and claims on hand and received			1,545	$2,278,278 86
Number of accounts referred for settlement in fiscal year	788	861,058 95		
Number of claims referred for settlement in fiscal year	339	281,781 01		
Number of claims transferred to other branches	13	4,157 19		
Number of claims rejected during fiscal year	95	400,016 19		
Number of claims suspended at close of fiscal year	75	117,939 41		
Total number of accounts and claims referred, rejected, and suspended			1,310	1,664,952 75
Number of accounts awaiting action July 1, 1874	80	480,230 56		
Number of claims awaiting action July 1, 1874	155	133,095 55		
Total number and amount			235	613,326 11

Statement of claims under act of July 4, 1864, chapter 240, in the Quartermaster-General's Office, for the fiscal year ending June 30, 1874.

	Number.	Amount.	Number.	Amount.
On hand July 1, 1873, which had previously been suspended or had received no decisive action	11,347	$7,822,829 55		
Received during the year	2,606	3,144,572 34		
Total number on hand and received			13,953	$10,967,401 89
Decisive action taken during the year:				
Approved	881	495,234 38		
Reductions on claims approved		537,250 47		
Rejected	528	694,152 19		
Total upon which final action has been taken			1,409	1,726,637 04
Remaining on hand July 1, 1874			12,544	9,240,764 85

Statement of miscellaneous claims and accounts in the Quartermaster-General's Office for the fiscal year ending June 30, 1874.

	Number.	Amount.	Number.	Amount.
On hand July 1, 1873, which had previously been suspended or had received no decisive action	14,046	$7,475,120 87		
Number of claims received during the fiscal year	5,184	1,258,055 38		
Number of accounts received during the fiscal year	7,062	486,968 91		
Total number on hand and received			26,292	$9,220,145 16
Decisive action taken during the year:				
Claims approved	5,040	738,950 73		
Reduction on claims approved		269,916 37		
Claims rejected	540	271,992 79		
Claims referred to other Departments	53	5,703 25		
Accounts approved	6,180	442,966 93		
Reduction on accounts approved		4,682 01		
Accounts rejected	35	7,935 42		
Total upon which final action has been taken			11,848	1,742,147 50
Remaining on hand July 1, 1874:				
Claims	13,597	7,448,418 23		
Accounts	847	29,579 43		
Total number and amount			14,444	7,477,997 66

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The following is a statement of the public funds in my possession during the fiscal year:

On hand July 1, 1873	
Received from officers of the Army	$143,620 86
Received from the Treasury Department	64,561 94
Received from indebted railroad companies	8,690 21
Received from other sources	25,076 52
Total received during the year	241,949 53

Disbursed during the year	$60,723 90
Transferred to other offices	147,484 63
Deposited to the credit of the United States Treasurer	33,741 00
Remaining on hand June 30, 1874	
Total disbursed, &c., during the year	241,949 53

Attention is respectfully invited to the following-described papers accompanying this report:

A.—Statement of the indebtedness to the United States of southern railroad companies on account of purchase of railway-material for the fiscal year.

B.—Extract copy of report of Capt. G. F. Price, Fifth Cavalry, in charge of construction of military telegraph in Arizona.

C.—Extract copy of report of Mr. R. R. Haines, superintendent of construction of military telegraph in Arizona.

D.—Statement of all troops and stores transported under direction of the Quartermaster's Department during the fiscal year.

E.—Abstract of contracts made by officers of the Quartermaster's Department for wagon-transportation during the fiscal year.

F.—Abstract of contracts made by officers of the Quartermaster's Department for water-transportation.

G.—Statement of vessels chartered and employed by officers of the Quartermaster's Department during the fiscal year.

H.—Statement of vessels owned or purchased by the Quartermaster's Department during the fiscal year.

Very respectfully, your obedient servant,

M. I. LUDINGTON,
Quartermaster, U. S. A.

Brig. Gen. M. C. MEIGS,
Quartermaster-General, U. S. A.

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A.—*Monthly statement of the indebtedness of certain railway companies for railway material and rolling-stock purchased under provisions of executive orders of August 8 and October 14, 1865, and orders of the Quartermaster-General, U. S. A., for the year ending June 30, 1874.*

Number.	Name of company indebted to the United States July 1, 1873,	Value of property sold.	Interest on same to June 30, 1874.	Total expenses to June 30, 1874.	Total principal, interest, and expenses to June 30, 1874.	Balance of principal unpaid July 1, 1873.	Balance of interest unpaid July 1, 1873.	Expenses unpaid July 1, 1873.	Total principal, interest, and expenses unpaid July 1, 1873.
1	Alexandria, Loudoun and Hampshire	$62,592 96	$21,236 00	$175 73	$84,004 69	$6,790 45	$23 08	.....	$6,813 53
2	Alabama and Chattanooga	30,248 52	13,665 76	543 03	44,457 31	3,933 61	46 41	.....	3,980 02
3	East Tennessee and Georgia	366,183 02	160,986 77	2,322 73	529,492 52	350,447 58	21,567 75	.....	372,015 33
4	East Tennessee and Virginia	265,655 65	116,906 07	2,322 73	384,884 45	248,649 26	.....	.....	248,649 26
5	Edgefield and Kentucky	114,772 86	72,583 88	2,945 00	190,303 74	114,772 86	62,342 37	$2,345 00	179,460 23
6	Knoxville and Kentucky	12,335 63	5,662 64	154 27	18,152 54	9,544 89	1,271 36	.....	10,816 25
7	McMinnville and Manchester	46,508 54	27,852 37	3,975 20	78,336 11	46,508 54	24,453 52	3,375 20	74,337 26
8	Mississippi, Gainesville and Tuscaloosa	33,476 39	20,057 35	67 75	53,601 49	33,476 39	9,037 09	.....	42,513 48
9	Mobile and Ohio	505,143 70	90,864 06	.....	596,007 76	74,269 05	18,233 00	.....	92,502 05
10	Memphis, Clarkesville and Louisville	336,932 36	212,238 07	3,045 00	552,215 43	336,932 36	132,861 78	.....	469,794 14
11	Memphis and Little Rock	153,673 89	57,856 31	75 40	211,605 60	76,769 92	10,471 37	.....	87,241 29
12	Nashville and Chattanooga	1,566,551 73	615,631 70	2,234 12	2,184,417 55	1,474,206 55	349,393 58	.....	1,823,600 13
13	Nashville and Northwestern	525,400 26	335,760 34	2,234 11	863,394 71	521,192 58	245,015 10	.....	766,207 68
14	Nashville and Decatur	405,193 92	144,407 99	302 35	549,904 26	280,820 10	24,988 53	.....	305,808 63
15	Southwest Branch Pacific Railroad of Missouri	57,115 24	.....	.....	57,115 24	41,856 25	.....	.....	41,856 25
16	Selma, Rome and Dalton	183,276 49	94,612 71	53 95	277,943 15	124,839 47	8,489 07	.....	133,328 54
	Total	4,665,061 16	1,990,324 02	20,451 37	6,675,836 55	3,745,009 86	908,194 01	5,720 20	4,658,924 07

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A.—*Monthly statement of the indebtedness of certain railway companies for railway material and rolling-stock purchased, &c*—Continued.

Number.	Name of company indebted to the United States July 1, 1873.	Interest and expenses for the year ending June 30, 1874.	Total to June 30, 1874.	Increase of the debt during the year ending June 30, 1874.	Decrease of the debt during the year ending June 30, 1874.	Total payments to June 30, 1873.	Payments made during the year ending June 30, 1874.	Total payments made to June 30, 1874.
1	Alexandria, Loudoun and Hampshire	$382 98	$7,196 51		$2,387 20	$76,808 18	$2,770 18	$79,578 36
2	Alabama and Chattanooga	57 72	4,037 74		3,980 02	40,419 57	4,037 74	44,457 31
3	East Tennessee and Georgia		372,015 33		5,942 95	157,477 19	5,942 95	163,420 14
4	East Tennessee and Virginia		248,649 26		17,203 57	136,235 19	17,203 57	153,438 76
5	Edgefield and Kentucky	8,977 92	188,438 15	$8,977 92		1,865 59		1,865 59
6	Knoxville and Kentucky	696 89	11,513 14	696 89		6,639 40		6,639 40
7	McMinnville and Manchester	3,995 10	78,332 36	3,984 60		3 75	10 50	14 25
8	Mississippi, Gainesville and Tuscaloosa	1,231 92	43,745 40	1,231 92		9,856 09		9,856 09
9	Mobile and Ohio	5,176 73	97,678 78		31,653 36	498,328 98	36,830 09	535,159 07
10	Memphis, Clarkesville and Louisville	25,196 04	494,990 18	22,118 46		57,225 25	3,077 58	60,302 83
11	Memphis and Little Rock	5,604 18	92,845 47	5,604 18		118,760 13		118,760 13
12	Nashville and Chattanooga		1,823,600 13			360,817 42	27,456 23	388,273 65
13	Nashville and Northwestern	38,047 03	804,254 71	32,819 99		59,139 90	5,227 14	64,367 04
14	Nashville and Decatur		305,808 63			244,095 63		244,095 63
15	Southwest Branch Pacific Railroad of Missouri		41,856 25		14,182 30	15,258 99	14,182 30	29,441 29
16	Selma, Rome and Dalton	9,113 26	142,441 80	9,060 63		135,501 35	52 63	135,553 98
	Total	98,479 77	4,757,403 84	84,494 59	75,349 40	1,918,432 60	116,790 91	2,035,223 52

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A.—*Monthly statement of the indebtedness of certain railway companies for railway-material and rolling-stock purchased, &c.*—Continued.

Number.	Name of company indebted to the United States July 1, 1873.	Balance of interest unpaid July 1, 1874.	Expenses unpaid July 1, 1874.	Balance principal unpaid July 1, 1874.	Total principal, interest, and expenses unpaid July 1, 1874.	Remarks.
1	Alexandria, Loudoun and Hampshire	$48 04	.....	$4,378 29	$4,426 33	Due June 30, 1873; $45,000 first-mortgage bonds held as collaterals.
2	Alabama and Chattanooga	.....	.....	.....	.....	Debt discharged November 1, 1873.
3	East Tennessee and Georgia	15,624 80	.....	350,447 58	366,072 38	Companies consolidated; debts compromised for $195,000—$5,000 cash, balance payable one-half in 10 and one-half in 15 years from January 1, 1872, with 4 per cent. interest.
4	East Tennessee and Virginia	.....	.....	231,445 69	231,445 69	
5	Edgefield and Kentucky	70,720 29	$2,945 00	114,772 86	188,438 15	Due April 30, 1871.
6	Knoxville and Kentucky	1,968 25	.....	9,544 89	11,513 14	Due August 30, 1869. Suit pending.
7	McMinnville and Manchester	27,848 62	3,964 70	46,508 54	78,321 86	Due July 1, 1869. Suit pending.
8	Mississippi, Gainesville and Tuscaloosa	10,269 01	.....	33,476 39	43,745 40	Company bankrupt.
9	Mobile and Ohio	.....	.....	60,848 69	60,848 69	Due July 31, 1871.
10	Memphis, Clarkesville and Louisville	154,881 61	98 63	336,932 36	491,912 60	Due October 31, 1869.
11	Memphis and Little Rock	16,075 55	.....	76,769 92	92,845 47	Due April 25, 1874. Suit pending
12	Nashville and Chattanooga	321,937 35	.....	1,474,206 55	1,796,143 90	Compromised for $1,000,000, payable one-half in 10 and one-half in 20 years from June 1, 1871, with 4 per cent. interest.
13	Nashville and Northwestern	277,835 09	.....	521,192 58	799,027 67	Due November 30, 1870. Suit pending.
14	Nashville and Decatur	24,988 53	.....	280,820 10	305,808 63	Compromised for $70,000—$6,000 cash, balance in 10 years from July 1, 1872, with 5 per cent. interest.
15	Southwest Branch Pacific Railroad of Missouri.	.....	.....	27,673 95	27,673 95	Payable in transportation; one-half to be applied.
16	Selma, Rome and Dalton	17,549 70	.....	124,839 47	142,389 17	$3,000 payable monthly in money; postal and military transportation earnings to be credited.
	Total	939,746 84	7,008 33	3,693,857 86	4,640,613 03	

NOTE.—The indebtedness of the East Tennessee and Virginia, the East Tennessee and Georgia, the Nashville and Chattanooga, and the Nashville and Decatur Railroad Companies, having been compromised under the act of March 3, 1871, and the balance admitted to be due having been made payable to the Assistant Treasurer of the United States at New York City, and the Mississippi, Gainesville and Tuscaloosa Railroad Company being bankrupt, the names of these companies will hereafter be dropped from the list of companies indebted to the Quartermaster's Department.

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The following-named railroad companies have discharged their indebtedness to the United States.

Number.	Name of company indebted to the United States July 1, 1873.	Value of property sold.	Interest on same to June 30, 1874.	Total expenses to June 30, 1874.	Total principal, interest, and expenses to June 30, 1874.	Total payments made to June 30, 1874.	Total principal, interest, and expenses unpaid July 1, 1874.	Remarks.
1	Richmond, Fredericksburg and Potomac	$7,449 27	.....	.....	$7,449 27	$7,449 27	.....	Debt discharged January 1, 1866.
2	Georgia Railroad and Banking Company	11,935 05	.....	.....	11,935 05	11,935 05	.....	Debt discharged January 12, 1866.
3	Southwestern	46,159 89	.....	.....	46,159 89	46,159 89	.....	Debt discharged May 4, 1866.
4	Macon and Western	83,638 15	.....	.....	83,638 15	83,638 15	.....	Debt discharged November 24, 1866.
5	South Carolina	23,458 50	$1,646 76	.....	25,105 26	25,105 26	.....	Debt discharged January 31, 1867.
6	Muscogee	5,244 20	424 57	.....	5,668 77	5,668 77	.....	Debt discharged May 15, 1867.
7	Petersburg	65,000 00	3,633 60	.....	68,633 60	68,633 60	.....	Debt discharged August 26, 1867.
8	Memphis and Charleston	547,494 09	30,889 64	.....	578,383 73	578,383 73	.....	Debt discharged October 16, 1867.
9	Mobile and Great Northern	14,637 73	1,192 55	.....	15,830 28	15,830 28	.....	Debt discharged October 31, 1867.
10	New Orleans, Jackson and Great Northern	200,865 58	15,656 91	.....	216,522 49	216,522 49	.....	Debt discharged February 29, 1868.
11	Mississippi Central	78,460 00	6,368 56	.....	84,828 56	84,828 56	.....	Debt discharged April 11, 1868.
12	Mississippi and Tennessee	102,880 00	14,371 05	.....	117,251 05	117,251 05	.....	Debt discharged April 16, 1868.
13	Montgomery and West Point	36,559 66	3,324 93	.....	41,884 59	41,884 59	.....	Debt discharged July 16, 1868.
14	Virginia Central	70,000 00	10,364 66	.....	80,364 66	80,364 66	.....	Debt discharged July 21, 1868.
15	Rome	22,086 05	1,778 57	.....	23,864 62	23,864 62	.....	Debt discharged August 10, 1868.
16	Western and Atlantic	472,944 66	70,194 71	.....	543,139 37	543,139 37	.....	Debt discharged August 27, 1868.
17	Orange and Alexandria	118,895 74	12,497 44	.....	131,393 18	131,393 18	.....	Debt discharged October 3, 1868.
18	Manassas Gap	4,623 51	864 87	.....	5,488 38	5,488 38	.....	Debt discharged October 8, 1868.
19	Wilmington and Weldon	81,500 00	9,946 31	.....	91,446 31	91,446 31	.....	Debt discharged November 4, 1868.
20	Alabama and Florida	51,912 00	6,355 18	.....	58,267 18	58,267 18	.....	Debt discharged May 31, 1869.
21	New Orleans, Opelousas and Great Western	113,773 45	11,947 35	.....	125,720 80	125,720 80	.....	Debt discharged August 21, 1869.
22	Norfolk and Petersburg	2,112 00	.....	.....	2,112 00	2,112 00	.....	Debt discharged January 11, 1870.
23	Western North Carolina	14,269 82	2,084 08	$48 00	16,401 90	16,401 90	.....	Debt discharged June 6, 1870.
24	Atlantic and North Carolina	51,453 93	11,040 15	.....	62,494 08	62,494 08	.....	Debt discharged July 31, 1870.
25	Macon and Brunswick	26,820 00	4,861 44	61 80	31,743 24	31,743 24	.....	Debt discharged January 25, 1871.
26	Selma and Meridian	146,327 92	23,936 79	568 00	170,832 71	170,832 71	.....	Debt discharged June 13, 1871.
27	San Antonio and Mexican Gulf	48,775 19	17,048 49	4 25	65,827 93	65,827 93	.....	Debt discharged June 14, 1871.
28	Washington, Alexandria and Georgetown	324 06	.....	.....	324 06	324 06	.....	Debt discharged August 16, 1871.
29	Memphis and Ohio	106,929 13	22,998 78	.....	129,927 91	129,927 91	.....	Debt discharged October 27, 1871.
30	New Orleans and Ohio	32,150 00	13,719 95	4,647 20	50,517 15	24,728 28	$25,788 87	Company bankrupt; account, therefore, dropped from list of indebted companies.
31	Pacific Railroad, of Missouri	125,433 65	.....	.....	125,433 65	125,433 65	.....	Debt discharged July 12 1872.
32	Alabama and Florida, for repairs	27,109 04	.....	7,029 40	34,138 44	34,138 44	.....	Debt discharged January 18, 1873.
33	Indianola	20,000 00	.....	.....	20,000 00	20,000 00	.....	Debt discharged May 24, 1873.
34	Mississippi and Tennessee	127,750 52	30,510 41	.....	158,260 93	158,260 93	.....	Debt discharged May 31, 1873.
	Total	2,890,972 79	327,657 75	12,358 65	3,230,989 19	3,205,200 32	25,788 87	

I certify the above statement to be correct,

M. I. LUDINGTON,
Major and Quartermaster, U. S. A., in charge of Railroad Indebtedness.

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B.—*Extract copy of report of Capt. G. F. Price, Fifth Cavalry, in charge of construction of military telegraph in Arizona.*

ARIZONA MILITARY TELEGRAPH,
Prescott, Ariz., December 22, 1873.

To the Chief Quartermaster Department of Arizona:

I have the honor respectfully to report that the duties assigned me in your two communications of June 24, 1873, connected with the reconnaissance and location of the line of the Arizona military telegraph, and general duties pertaining to the Quartermaster's Department in connection therewith, are completed.

The reconnaissance commenced at Prescott, Ariz., June 28, 1873, and terminated at San Diego, Cal., August 2, 1873, during which period the entire line was located, and contracts made for poles at an average of $1.42 each. The work of construction commenced at San Diego, Cal., August 28, 1873; at Prescott, Ariz., September 2, 1873; at Yuma, Ariz., September 20, 1873; and at Maricopa Wells, Ariz., October 11, 1873. The entire line was completed to Tucson, Ariz., December 2, 1873. In ninety-seven days the troops completed five hundred and forty miles of telegraph-line, a feat which may be proudly stated is without parallel in the history of telegraph construction. The officers in charge of troops were Capt. William E. Dove, Twelfth Infantry, from San Diego to Yuma, one hundred and sixty-six miles; Lieut. John F. Trout, Twenty-third Infantry, from Prescott to Maricopa Wells, one hundred and fourteen miles; Lieut. G. B. McDermott, Twenty-third Infantry, from Yuma to Oatman Flat, one hundred miles, and myself in addition to general duties in personal charge of the construction from Oatman Flats to Tucson, via Maricopa Wells, one hundred and sixty miles.

The whole number of poles used in construction from San Diego to Tucson via Maricopa Wells is 7,882; of this number 2,500 are redwood, purchased in Santa Cruz, Cal., and shipped to San Diego, and from thence hauled on the line of the San Diego and Yuma division. The redwood poles cost in Santa Cruz 85 cents, coin. The other poles, all cotton-wood and willows, cost in currency as follows: 400, at $1 each; 2,440, at $1.25 each; 1,892, at $1.50 each; 680, at $1.75 each. Of the cotton-wood and willow poles there are surplus and piled at stations, for repair-purposes, about 150.

The number of poles used in construction from Prescott to Maricopa Wells, one hundred and fourteen miles, is not accurately known to me. This can be ascertained from the officer in charge, who accounted for the material expended.

The number will approximate 1,950, ranging in cost from $1.25 to $2 each. Total number of poles used in construction, 9,820. The length of the line by wire is about five hundred and forty miles.

We have of surplus material nearly one hundred miles of wire, one thousand each of brackets and insulators, and the tools purchased for construction.

The redwood poles have proved (by reason of transportation) the most expensive at the commencement, but will be the cheapest at the end. The cotton-wood will remain sound from eighteen months to three years, according to the nature of the soil in which they are planted.

The willows will probably remain sound from three to five years. I doubt if any of the poles are long enough to bear resetting; but as they decay mesquit butts can be cut and placed in the ground beside the poles and securely wired to them.

On account of the small appropriation, the most rigid and exacting economy was necessary to secure the completion of the line as contemplated by the act of Congress. The best work the Territory could furnish was used. The number of poles to the mile were too few, and the length not sufficient. A line should not be constructed with less than twenty poles to the mile, and not less than twenty feet in length, 6 by 6 at butt and 4 by 4 at tip.

This line was constructed with 18-foot poles and seventeen to the mile. The wire No. 10, annealed. It should have been No. 9, galvanized; but when the conditions of climate and the sparsely-settled country are considered, it can be said the materials employed in construction will answer until such time as improved means of transportation penetrate the Territory.

A portion of the wire used was of inferior quality, breaking readily with a slight strain or when making joints, and a considerable portion of it was old, evidently having been used on other lines, taken down, repaired, and coiled for sale, as opportunity presented, which opportunity appears to have shown itself in this line, where a small sum of money was forced to go a long way.

The question of the line becoming self-sustaining will be speedily answered, and I believe in the affirmative.

* * * * * * * *

Very respectfully, your obedient servant,

GEO. F. PRICE,
Captain Fifth Cavalry, in charge of construction.

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C.—*Extract copy of report of Mr. R. R. Haines, superintendent of construction of military telegraph in Arizona.*

SAN FRANCISCO, *January* 20, 1874.

SIR: * * * Commencing at San Diego, the line runs parallel with the San Diego and Yuma stage-road southeasterly seven miles, then turns east and follows a partially-constructed wagon-road on the line surveyed for a county road, through a succession of valleys and rocky cañons thirty miles, where it intersects the stage-road and again runs parallel to it until it reaches Indian Wells station, a point on the Colorado desert, one hundred and ten miles east of San Diego. From Indian Wells the course is nearly due east across a sandy mesa north of and nearly parallel with the boundary-line between the United States and Mexico to Fort Yuma. Crossing the Colorado River at Fort Yuma by suspension, the general course of the traveled road is followed up the Gila River to Maricopa Wells, from thence across the Gila and Salt Rivers in a nearly direct north course to the town of Phœnix, from which point the general course of the stage-road is followed to Wickenberg. From Wickenberg a direct course is followed by trail through People's Valley to Prescott or Camp Whipple.

The branch to Tucson is from Maricopa Wells along the stage-road to Sacaton, Adamsville, and Florence to Tucson.

All of the line is run in American territory. The country through which the line passes is generally very favorable for the construction of and maintenance of telegraph-lines. At no other point than on the mountains near Prescott is there any timber to endanger the wire. There are many miles of rocky mountains and cañons, but generally the ground is very favorable for the firm setting of poles. The only marked exception worthy of note is about five miles of drifting sand twenty miles west of Fort Yuma. At this point several poles were undermined by a sand-storm immediately after erection. It is, however, presumed a little experimenting will enable repairers to overcome serious difficulties at that point.

There is, within a fraction, more or less, five hundred and fifty miles of wire suspended.

There was purchased and placed at my command six hundred and thirty miles of material. There is of that amount eighty miles (a little more or less) surplus lying at stations in the hands of quartermasters and agents.

* * * * * * *

The poles are of mixed lumber. Twenty-five hundred used on the western end are superior redwood, 6 inches diameter at base and tapered to 4 inches at top. The balance of the poles are mainly cotton-wood, a small percentage only of willow, cedar, oak, and pine. Cotton-wood is a very inferior lumber, but with the exception of pine is the only lumber obtainable in Arizona, and almost universal testimony gives the former preference over the latter. Many of the poles are very crooked. Straight poles in sufficient numbers and of the requisite length could not be obtained. From general testimony it is believed the cotton-wood poles will last two years in their present setting and three years after being reset. I think it safe to calculate the posts now in the line will be sufficient for five years. The redwoods will probably outlive the wants of the present line.

* * * * * *

In closing this report of my labors I take the liberty to congratulate the Department over which you have the honor to preside, and the citizens of Arizona, upon the acquisition of telegraph communication. And I most warmly return thanks to the officers of the Department for courtesies and kindnesses extended to me.

And I beg specially to acknowledge my indebtedness to Capt. Geo. F. Price, Fifth Cavalry, who bore with me the "heat and burden of the day."

I have the honor to remain your obedient servant,

R. R. HAINES,
Superintendent of Construction Arizona Military Telegraph.

Col. ROBERT ALLEN,
Quartermaster Department of the Pacific.

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D.—*Statement of all troops and stores transported under the direction of the Quartermaster's Department during the fiscal year ending June 30, 1874.*

Kind of transportation.	Passengers.			Animals.				Stores.					
	Officers.	Men.	Total.	Horses.	Mules.	Cattle.	Total.	Commissary stores.	Quartermaster's stores.	Ordnance stores.	Medical stores.	Miscellaneous stores.	Total No. of pounds.
NOT OWNED OR RUN BY GOVERNMENT.								*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
Railroads	1,111	23,499	24,610	2,987	1,868	.....	4,855	28,200,799	42,379,694	10,865,851	698,168	8,954,819	91,099,331
Steamboats, barges, &c	384	8,203	8,587	455	321	64	840	14,094,732	30,327,792	10,010,307	743,178	3,893,833	59,069,842
Stages	526	1,729	2,255	.....	.....	.....	.....	2,394	2,588	134	.....	2,183	7,299
Wagons	.....	.....	.....	.....	.....	.....	.....	13,144,025	17,947,301	1,556,981	397,153	4,675,440	37,720,900
Total not owned or run by Government	2,021	33,431	35,452	3,442	2,189	64	5,695	55,441,950	90,657,375	22,433,273	1,838,499	17,526,275	187,897,372
OWNED OR RUN BY GOVERNMENT.													
Steamboats, barges, &c	1,601	7,106	8,707	19	115	4	138	1,850,041	3,420,912	2,579,875	52,974	2,608,062	10,511,864
Total owned or run by Government	1,601	7,106	8,707	19	115	4	138	1,850,041	3,420,912	2,579,875	52,974	2,608,062	10,511,864
Grand total	3,622	40,537	44,159	3,461	2,304	68	5,833	57,291,991	94,078,287	25,013,148	1,891,473	20,134,337	198,409,236

Respectfully submitted.

QUARTERMASTER-GENERAL'S OFFICE, *August* 29, 1874.

M. I. LUDINGTON,
Quartermaster, United States Army

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E.—*Abstract of contracts for wagon-transportation entered into by the Quartermaster's Department received at the Office of the Quartermaster-General during the fiscal year ending June 30, 1874.*

Names of officers.	Names of contractors.	Date of contract.	Route of supply.	Rates.	Date of expiration of contract.
Maj. R. N. Batchelder, chief quartermaster Department of the Columbia, Portland, Oreg.	Edwin Stone	Sept. 10, 1873	From Wallala to Fort Walla-Walla, Wash	35 cts. per 100 lbs. for entire distance.	June 30, 1874
Maj. B. C. Card, chief quartermaster Department of Dakota, Saint Paul, Minn.	E. G. Maclay	Apr. 1, 1874	From Fort Benton and any other points in Montana Territory, and any other points on the Union Pacific Railroad to any posts in the Territory of Montana.	97 cts. per 100 lbs. per 100 miles	Mar. 31, 1875
Do	Edmund T. Winston	Feb. 25, 1874	Route No. 4. From Saint Paul or Saint Cloud, Minn., or Fort Stevenson, or other posts on the Missouri River, Dakota Territory, or any point on the Northern Pacific Railroad, to any posts now, or which may be, established during the existence of the contract in the State of Minnesota, or in that portion of Dakota Territory lying north and east of the Missouri River.	$1.27½ per 100 lbs. per 100 miles, (average.)	Mar. 31, 1875
Col. A. R. Eddy, deputy quartermaster-general, San Francisco, Cal.	John A. Smith	May 1, 1874	Wagon-transportation in San Francisco, Cal. and vicinity.	Various	June 30, 1875
Capt. John V. Furey, assistant quartermaster, U. S. A.	Tully & Ochoa	Nov. 30, 1872	From Tucson, Ariz., and Camp Apache	11 cts. per lb. for whole distance.	June 30, 1873
Capt. James Gillis, assistant quartermaster U. S. A., Chicago, Ill.	John L. Stockton	July 10, 1873	Wagon transportation in the city of Chicago, Ill., and vicinity,	5 cts. per 100 lbs. from and to any point, irrespective of distance.	June 30, 1874
Lieut. Col. S. B. Holabird, chief quartermaster Department of Texas, San Antonio, Tex.	W. C. Graham	July 1, 1873	From Caddo, Ind. T., to Fort Sill, Ind. T. (Route No. 1.)	$1.02 per 100 lbs. per 100 miles	June 30, 1874
Do	do	July 1, 1873	Route No. 2. From Denison, Tex., to the following-named posts and at the following rates;		
			To Fort Richardson, 110 miles	$1.32 per 100 lbs. per 100 miles	June 30, 1874
			To Fort Griffin, 184 miles	$1.27 per 100 lbs. per 100 miles	
			To Fort Concho, 330 miles	$1.27 per 100 lbs. per 100 miles	
Do	A. S. Mair	July 1, 1873	Route No. 4. From Austin, Tex., to San Antonio, Tex.	$1.20 per 100 lbs. per 100 miles	June 30, 1874
Do	H. B. Adams	July 1, 1873	Route No. 5. From Victoria or other points on the Gulf, Western Texas and Pacific Railroad, to San Antonio, Tex., and any posts that may be hereafter established in Northwest Texas, south of Red River.	$1.21 per 100 lbs. per 100 miles	June 30, 1874
Do	do	June 1, 1873	Route No. 5.—Part 2. From San Antonio to the posts named below, and any posts that may hereafter be established in Northwest Texas, south of Red River; to Fort Clark, 126 miles; Fort Concho, 215 miles; Fort Davis, 466 miles;	$1.11 per 100 lbs. per 100 miles, inside route, and $1.31 per 100 lbs. per 100 miles outside route,	June 30, 1874

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			Fort Duncan, 155 miles; Fort Stockton, 394 miles; Fort Bliss, 691 miles; Fort Griffin, 305 miles; Fort McIntosh, 165 miles; Fort McKavitt, 175 miles; Fort Quitman, 611 miles; Fort Richardson, 320 miles.		
Do	H. Chamberlain	June 1, 1873	Route No. 6. From Ringgold Barracks to Fort McIntosh, Tex., 120 miles.	$1.19 per 100 lbs. per 100 miles	June 30, 1874
Do	A. S. Mair	Sept. 8, 1873	From Austin, Tex., to Fort McKavitt, Tex	$2.30 per 100 lbs. entire distance	June 30, 1874
Maj. Henry C. Hodges	Laurence Hart	May 30, 1874	Wagon-transportation in the city of New Orleans, La., and vicinity.	Various	June 30, 1875
Maj. A. J. Perry, chief quartermaster Department of the Platte,	C. Hechh and C. Hunter	June 24, 1873	From Medicine Bow to Fort Fetterman, Wyo.	$1.23 per 100 lbs. per 100 miles	June 30, 1874
Do	W. P. Noble	June 24, 1873	From Bryan, Wash., to Camp Stambaugh and Camp Brown, Wyo.	2.58½ per 100 lbs. per 100 miles, (average.)	June 30, 1874
Do	J. D. May	June 24, 1873	From Cheyenne to Fort Fetterman and Fort Laramie.	To Laramie 90 cts. per 100 lbs., from July 1 to Nov. 15, 1873, and from March 15 to June 30, 1874, and $1.12½ from Nov. 15, 1873, to March 15, 1874; to Fetterman, $1.65 from July 1 to Nov. 15, 1873, and from March 15 to June 30, 1874; and $2 from Nov. 15, 1873, to March 15, 1874.	June 30, 1874
Do	George Burke	June 30, 1873	From McPherson station, on Union Pacific Railroad, to Fort McPherson, Nebr.	33 1-6 cts. per 100 lbs	June 30, 1874
Do	Oliver Durant and E. J. Cutting.	Dec. 3, 1873	From southern terminus of Utah Southern Railroad to Beaver, Utah.	$1.35 per 100 lbs. per 100 miles	June 30, 1874
Col. Rufus Saxton, chief quartermaster Department of the Columbia.	Charles Russell	May 21, 1873	From Vancouver or Portland to Fort Lapwai, Idaho. (Route No. 9.)	July to Oct., inclusive, 1873, 9 cts.; Nov. and Dec., 25 cts.; Jan. to March 15, inclusive, 1874, 50 cts.; April to June, inclusive, 1874, 9 cts per lb. for the whole distance.	June 30, 1874
Do	W. P. Winans	May 1, 1873	Route No. 10. From Portland or Vancouver to Fort Colville, Wash.	July to Oct., inclusive, 1873, 7 89-100 cts.; Nov. and Dec., 1873, Jan. to Mar., inclusive, 1874, 14 75-100 cts.; April, May, and June, 1874, 7 89-100 cts. per lb. for whole distance.	June 30, 1874
Do	Charles Russell	May 21, 1873	Route No. 11. From Vancouver or Portland to Fort Boise, Idaho.	July to Sept., inclusive, 1873, 12 cts.; Nov. and Dec., 50 cts; Jan. to March, inclusive, 1874, 75 cts.; April, May, and June, 1874, 12 cts. per lb. for whole distance.	June 30, 1874
Do	do	May 21, 1873	Route No. 12. From Vancouver or Portland to Camp Harney, Oreg.	July to Oct., inclusive, 1873, 10 cts.; Nov. and Dec., 50 cts; Jan. to Mar., inclusive, 1874, 75 c's; April to June, inclusive, 1874, 10 cts. per lb. for the whole distance.	June 30, 1874

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E.—*Abstract of contracts for wagon-transportation entered into by the Quartermaster's Department, &c.*—Continued.

Names of officers.	Names of contractors.	Date of contract.	Route of supply.	Rates.	Date of expiration of contract.
Col. Rufus Saxton, chief quartermaster Department of the Columbia.	Charles Russell.....	May 21, 1873	Route No. 13. From Vancouver or Portland to Camp Warner, Oreg.	July to Oct., inclusive, 1873, 13½ cts.; Nov. and Dec., 50 cts.; Jan. to Mar., inclusive, 1874, 75 cts.; April to June, inclusive, 1874, 13½ cts. per lb. for the whole distance.	June 30, 1874
Do.....	Thomas Wheeler	May 1, 1873	Route No. 17. From Reno to Camp Warner, Oreg.	July to Nov., inclusive, 1873, 7 cts.; Dec., 15 cts.; Jan., Feb., March, 1874, 15 cts.; April, May, and June, 1874, 7 cts.	June 30, 1874
Do.....	Alex. Martin.....	May 1, 1873	Route No. 19. From terminus Oregon and Columbia Railroad, now at Roseburg, Oreg., to Fort Klamath.	July to Oct., inclusive, 1873, 5½ Nov. and Dec., 27 cts.; April, May, and June, 1874, 5½ cts. per lb. for whole distance.	June 30, 1874
Capt. M. P. Small, commissary of subsistence, acting chief quartermaster Department of Arizona.	Estevan Ochoa.....	Mar. 10, 1874	Route No. 1. From Yuma depot, Yuma, Ariz., to Camp Apache, Bowie, Grant, McDowell, and Lowell, or to any post or posts which may be established south of thirty-fourth parallel of north latitude and east of the Colorado River, in the Deparement of Arizona.	From Yuma depot, Ariz., to Camp Apache, Ariz., $2.87; to Camp Bowie, Ariz., $1.85; to Camp Grant, Ariz., $1.85; to Camp McDowell, Ariz., $1.85; to Camp Lowell, Ariz., $1.85 per 100 lb. per 100 miles.	June 30, 1875
Col. Stewart Van Vliet, chief quartermaster Department of the Missouri.	Eugene B. Allen	May 14, 1874	Route No. 2. From points on the Atchison, Topeka and Santa Fé, Kansas Pacific, Denver and Rio Grande, and Missouri, Kansas and Texas Railroads, to posts in the Department of Missouri and in the State of Texas north of Red River and west of the ninety-seventh meridian, and Camp Apache, Ariz.	$1.05 per 100 lbs. per 100 miles..	Mar. 31, 1875

Respectfully submitted.

M. I. LUDINGTON,
Quartermaster, United States Army.

QUARTERMASTER GENERAL'S OFFICE, 1874

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F.—*Abstract of contracts for water-transportation entered into by the Quartermaster's Department received at the Quartermaster-General's Office during the fiscal year ending June 30, 1874.*

Names of officers.	Names of contractors.	Date of contract.	Route of supply.	Rates.	Date of expiration of contract.
Col. D. H. Rucker, A. Q. M. Gen	S. B. Coulson	Mar. 20, 1873	Sioux City, Iowa, and Yankton, Dak., to Fort Benton, and intermediate points on the Missouri River, and return.	Schedule rates	Oct. 31, 1874
Do	do	Mar. 20, 1873	Bismarck, or Fort A. Lincoln, to Fort Benton, and intermediate points.	do	Oct. 31, 1874
Lt. Col. S. B. Holabird, D. Q. M. Gen	C. A. Whitney & Co	July 1, 1873	New Orleans, La., to Galveston, Indianola, and Brazos Santiago, Tex., and return.	do	June 30, 1874
Do	H. E. Woodhouse	July 1, 1873	Brazos Santiago, Tex., to Fort Isabel, Fort Brown, and Ringgold Barracks, Tex., and intermediate points, and return.	do	June 30, 1874
Lt. Col. R. Saxton, D. Q. M. Gen	G. W. Warren	July 1, 1873	Astoria, Oreg., and Fort Stevens, Oreg., to Fort Cape Disappointment, Wash., and return.	$344 per month $35 for each extra trip $6 per hour for detention	June 30, 1874
Maj. William Myers, Q. M	Frank Hollingshead	July 1, 1873	Washington, D. C., to Forts Foote and Washington, Md., and return.	Schedule rates	June 30, 1874
Lt. Col. A. R. Eddy, D. Q. M. Gen	B. M. Hartshorn	July 1, 1873	San Francisco, Cal., to Fort Isabel, mouth of Colorado River, and return.	$12 50 per ton coin	June 30, 1874
Maj. J. J. Dana, Q. M	C. Jaeger	July 1, 1873	Ferriage across Colorado River at Fort Yuma	$250 per month	June 30, 1874

Respectfully submitted.

M. I. LUDINGTON,
Quartermaster, United States Army.

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G.—*Statement of vessels chartered, impressed, or employed by the Quartermaster's Department during the fiscal year ending June 30, 1874.*

	Class.	Tonnage.	When chartered.	Period of service. From—	To—	Where charter-money is payable.	By whom put in service, or employed.	Rate of pay	Amount paid	Total amount.
Henry Smith	Steamer	108	June 27, 1873	July 1, 1873	June 30, 1874	New York City	Col. R. Ingalls, A. Q. M.	per day	$80 00	$40,075 00
Eleanor	Sail-boat	Unknown	Oct. 12, 1869	July 1, 1873	June 30, 1874	Boston, Mass	Lieut. Col. R. O. Tyler, M Gen.	per day	1,950 00	1,950 00
Favorite	Sloop	do		July 1, 1873	Apr. 30, 1874	do	do	[illegible] load	337 50	337 50
				June 1, 1874	June 30, 1874					
Forest City	Tug		July 18, 1873	Aug. 19, 1873	Aug. 23, 1873*	Fort Pulaski, Ga	Lieut. H. W. Hubbell, A. A. Q. M.	$60 per day	240 00	240 00
				Aug. 26, 1873	Aug. 30, 1873					
				Sept. 1, 1873	Sept. 20, 1873†					
Porter	Steam-barge		Jan. 13, 1874	Jan. 13, 1874	Jan. 23, 1874	New Orleans, La	Maj. H. C. Hodges, Q. M	$80 per day	400 00	400 00
Joseph Edward	Schooner		Jan. 2, 1874	Jan. 2, 1874	Jan. 17, 1874	do	do	$10 per day	145 00	145 00
Do	do		Jan. 2, 1874	Jan. 2, 1874	Jan. 27, 1874	do	do	$100 trip	100 00	100 00
										$1,202 50

* Four days.

† Six and two fifths days.

Respectfully submitted.

M. I. LUDINGTON, *Quartermaster, U. S. Army.*

QUARTERMASTER-GENERAL'S OFFICE, *August* 29, 1874.

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II.—*Statement of vessels owned or purchased by the Government and employed in the Quartermaster's Department during the fiscal year ending June 30, 1874.*

Name.	Class.	Tonnage.	When purchased or built.	Estimated cost or value.	By whom employed.	Where employed.	Amount paid for repairs, &c.	Remarks.
Gen. A. A. Humphreys.	Steam-tug	45	1867.....	$11,500	Lieut. Col. R. O. Tyler, D. Q. M. Gen.	Boston, Mass	$5,635 08	This vessel is owned by the Engineer Department, and run in connection with that Department.
General Greene	St'm-launch	.....	Mar. 3, 1874	5,250	Lieut. James H. Lord, A. A. Q. M.	Fort McHenry, Md .	49 00	
Matchless	Schooner....	120	June 5, 1863	13,500	Maj. H. C. Hodges, Q. M....	Key West, Fla., and Fort Jefferson, Fla.	4,125 12	
Pulaski.....	St'm-launch	.....	Feb. 26, 1872	7,000	Capt. T. J. Eckerson, A. Q. M	Fortress Monroe, Va.	2,519 61	Employed at Fort Pulaski, Ga., until October, 1873, when sent to Charleston, S. C., thence to Fortress Monroe.
General McPherson....	Propeller ...	104.23	Sept. 1, 1867	40,000	Lieut. Col. A. R. Eddy, D. Q. M. G.	San Francisco, Cal..	24,998 34	
Margaret	Schooner....	22	Feb. 9, 1864	2,700	Maj. R. N. Batchelder, Q. M.	Portland, Oreg.....	833 59	Lost at sea, March 2, 1874, while *en route* from Sitka, Alaska, to San Juan Island.
General Jesup	St'm-launch	.....	June 30, 1874	5,000	.....	.....	....	Purchased for use at Fort Adams, R. I.
							38,160 74	

Respectfully submitted.

M. I. LUDINGTON, *Quartermaster, U. S. Army.*

QUARTERMASTER-GENERAL'S OFFICE, *August* 29, 1874.

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I.

[General Orders No. 107.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, September 1, 1874.

The following extracts from acts of Congress are published for the information and guidance of all concerned:

1. AN ACT making appropriations for the support of the Army for the fiscal year ending June thirtieth, eighteen hundred and seventy-five, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated, out of any moneys in the Treasury not otherwise appropriated, for the support of the Army for the year ending June thirtieth, eighteen hundred and seventy-five, as follows:

* * * That no part of the money appropriated by this act shall be paid to any railroad company for the transportation of any property or troops of the United States over any railroad which, in whole or in part, was constructed by the aid of a grant of public land on the condition that such railroad should be "a public highway for the use of the Government of the United States free from toll or other charge," or upon any other conditions for the use of such road, for such transportation; nor shall any allowance be made out of any money appropriated by this act for the transportation of officers of the Army over any such road when on duty and under orders as a military officer of the United States. But nothing herein contained shall be construed as preventing any such railroad from bringing a suit in the Court of Claims for the charges for such transportation, and recovering for the same, if found entitled thereto by virtue of the laws in force prior to the passage of this act.

Approved, June 16, 1874.

[This act is published in General Orders No. 58 of 1874.]

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2. AN ACT making appropriations to supply deficiencies in the appropriations for the service of the Government for the fiscal years ending June thirtieth, eighteen hundred and seventy-three and eighteen hundred and seventy-four, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, out of any money in the Treasury not otherwise appropriated, to supply deficiencies in the appropriations for the service of the Government for the fiscal year ending June thirtieth, eighteen hundred and seventy-four and for former years, and for other purposes, namely: * * *

For transportation of the Army, * * * being a deficiency for the fiscal year ending June thirtieth, eighteen hundred and seventy-three, not including Pacific Railroad accounts, one hundred and seventy-five thousand dollars: *Provided*, That no part of the sum appropriated by any provision of this act shall be paid to any railroad company which has received a grant of land on the condition that its road should be "a public highway, for the transportation of the property and troops of the United States free from toll or other charge."

Approved, June 22, 1874.

[This act is published in General Orders No. 79 of 1874.]

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3. AN ACT making additions to the fifteenth section of the act approved July 2, 1864, entitled "An act to amend an act entitled 'An act to aid in the construction of a railroad and telegraph line from the Missouri River to the Pacific Ocean, and to secure to the Government the use of the same for postal, military, and other purposes,' approved July 1, 1862."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be, and is hereby, added to the fifteenth section of the act approved July second, eighteen hundred and sixty-four, entitled "An act to amend an act entitled 'An act to aid in the construction of a railroad and telegraph line from the Missouri River to the Pacific Ocean, and to secure to the Government the use of the same for postal, military, and other purposes,' approved July first, eighteen hundred and sixty-two," the following words, namely: "And any officer or agent of the companies authorized to construct the aforesaid roads, or of any company engaged in

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operating either of said roads, who shall refuse to operate and use the road or telegraph under his control, or which he is engaged in operating for all purposes of communication, travel, and transportation, so far as the public and the Government are concerned, as one continuous line, or shall refuse, in such operation and use, to afford and secure to each of said roads equal advantages and facilities as to rates, time, or transportation, without any discrimination of any kind in favor of, or adverse to the road or business of any or either of said companies, shall be deemed guilty of misdemeanor, and, upon conviction thereof, shall be fined in any sum not exceeding $1,000, and may be imprisoned not less than six months. In case of failure or refusal of the Union Pacific Railroad Company, or either of said branches, to comply with the requirements of this act and the acts to which this act is amendatory, the party injured or the company aggrieved may bring an action in the district or circuit court of the United States in the Territory, district, or circuit in which any portion of the road of the defendant may be situated, for damages on account of such failure or refusal; and, upon recovery, the plaintiff shall be entitled to judgment for treble the amount of all excess of freight and fares collected by the defendant and for treble the amount of damages sustained by the plaintiff by such failure or refusal; and for each and every violation of or failure to comply with the requirements of this act a new cause of action shall arise; and in case of suit in any such Territory, district, or circuit, process may be served upon any agent of the defendant found in the Territory, district, or circuit in which such suit may be brought, and such service shall be by the court held to be good and sufficient; and it is hereby provided that for all the purposes of said act, and of the acts amendatory thereof, the railway of the Denver Pacific Railway and Telegraph Company shall be deemed and taken to be a part and extension of the road of the Kansas Pacific Railroad, to the point of junction thereof with the road of the Kansas Pacific Railroad Company at Cheyenne, as provided in the act of March third, eighteen hundred and sixty-nine."

Approved June 20, 1874.

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4. The annexed table of land-grant railroads, revised and corrected, is republished, for the information of all concerned.

5. To carry out the provisions of the aforementioned acts, and particularly the act approved June 16, 1874, as construed by the Solicitor-General, approved by the Attorney-General, in the opinion published in General Orders No. 84, Adjutant-General's Office, current series, and in the opinion rendered July 30, 1874, an extract from which will be found below, officers of the Quartermaster's Department are instructed to make no payments for the transportation of any property or troops of the United States over any of the railroads named in the table of land-grant railroads, out of the moneys appropriated by the act approved June 16, 1874, with the exception of the Oregon Central Railroad, to which railroad company full payment for such service may be made; and to make no payments for such service over any of the railroads named in said table out of the moneys appropriated by the act approved June 22, 1874, with the exception of the Atlantic and Pacific Railroad, from Springfield, Mo., to the Pacific Ocean; the New Orleans, Baton Rouge and Vicksburg; the Northern Pacific; the Oregon Central; the Saint Joseph and Denver City; the Southern Pacific Railroad of California, and branch line; the Texas and Pacific and the Utah Central Railroads; to which railroad companies full payments may be made, as heretofore, for such services rendered prior to July 1, 1874.

The following is the extract from the opinion above referred to:

* * * "If, therefore, a land-grant has been made to a company, to aid it in constructing, in whole or in part, a road between certain termini, upon condition of a certain use of such railroad, such condition affects the whole of what lies between the termini mentioned—no more, no less. Any subsequent change of terminus, by which, suppose, the road is extended, or, on the contrary, is transferred in part to another company, will not affect the original application of the condition. The latter continues in its original extent, and, where a part of the road has been transferred, follows it in the hands of its new owner. The circumstance that the company which operated the original road continues to operate it as extended or curtailed, without any change of name, does not affect the question, which, in every case, is as to the termini of the road at the time that the condition was affixed; the subject-matter to which such condition adheres being a road of such termini." * * * * *

6. Whenever accounts are presented by any of these land-grant railroad companies to officers of the Quartermaster's Department for payment for services rendered in transporting property or troops of the United States over said railroads, payment of which is prohibited by the aforementioned acts, they will be returned to the company presenting them, with the information that payment thereof is prohibited by law.

7. In settlement of accounts which include, in part, transportation over these land-grant railroads, and over other railroads not land-grant, officers of the Quartermaster's Department will issue certificates, as provided for in paragraph 34 of General Orders No. 98, Adjutant-General's Office, of 1872, for the full amount inuring to the land-grant

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railroad, modified so as to read as follows: "The said * * * railroad is a land-grant railroad; payment for the transportation is, therefore, prohibited by law." One copy of this certificate will be forwarded to the railroad company presenting the account, for use in settlement with its connecting lines; the other copy will be forwarded to the company over whose road the services were performed.

8. Separate bills of lading and separate requests for transportation over these land-grant railroads will be issued to each road in all cases where the stores or troops pass over land-grant roads only; but officers will be particular to note thereon that payment for the service is prohibited by law.

9. The Union Pacific, the Central Pacific, including the Western Pacific, the Kansas Pacific, the Central Branch Union Pacific, (formerly the Atchison and Pike's Peak Railroad,) and the Sioux City and Pacific Railroads, are excepted from the provisions of this order, so far as to allow officers to comply with that portion of General Orders No. 48, Adjutant-General's Office, of 1873, requiring them to forward all accounts of the above-named railroad companies, when presented to them for settlement, to the Office of the Quartermaster-General, properly prepared and certified, for administrative action. No payments will be made by officers of the War Department for transportation of any kind over these roads.

10. In conformity to the opinion of the Second Comptroller of the Treasury of July 28, 1874, authority is given for the re-imbursement of the actual cost of transportation over land-grant railroads, with the exception of the roads named in the preceding paragraph, of persons, not of the Army, (civilians hired,) holding appointment or employment under the United States, when on duty and traveling under orders at Government expense, whenever it is impracticable to furnish such persons with the necessary transportation request.

11. Officers in issuing the certificate authorized by paragraph No. 34, of General Orders No. 98, Adjutant-General's Office, of 1872, will, while on duty at any one station, number the certificates issued to each company consecutively from one upward; and, in stating the date at which the transportation was performed and the amount, will only give the amount withheld from the company in each month, (stating the month or months in which the transportation was performed,) and not the full amount represented by the voucher.

12. The bills of lading prescribed by General Orders No. 98, of 1872, should be numbered by each shipping-officer consecutively from one upward, and a corresponding entry made in the book of "Stores and property shipped;" and in the book of "Stores and property received" the entries in the column for "numbers" should correspond to the shipping-officer's number, as shown by the bill of lading. The space in both books should be carefully economized, and as many entries made on each page as practicable.

13. The attention of officers of the Quartermaster's Department is particularly invited to paragraph 4 of General Orders No. 98, of 1872, requiring them "*to ascertain the lowest through-rate, or any special rate less, at which the transportation will be performed, and cause the same to be inserted in the bill of lading.*"

14. That portion of paragraph 5 of said order which is in the following words, to wit, "*If payment is to be made at regular tariff-rates, the rates need not be stated in detail; simply say tariff-rates,*" applies only to local shipments—to shipments where there are no through or special rates, and where settlement must be made at the local rates of the respective roads over which the stores must pass.

15. Paragraphs 5, 8, 25, 34, 39, and 40, of General Orders No. 98, Adjutant-General's Office, of 1872, are hereby so far modified as to make them conform to the requirements of this order; and in line 11, of paragraph 8, of order 98, read 34 instead of 20.

16. Officers issuing a single "request" for transportation over a line composed of several roads will be particular to give the initial letters of each road or the general route to be traveled; and on the back of the "request" to state fully and specifically the purpose for which the journey is performed, in order to prevent trouble and delay in settlement of their accounts. Strict compliance in this respect with paragraph 47 of General Orders No. 98, of 1872, should be had.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General

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The following table of land-grant railroads in the United States, compiled from the statutes of the United States, records of the General Land-Office, and other official sources, revised and corrected, is republished for the information of all concerned.

Number.	Present names of companies owning or operating the roads.	Original names of companies to which grants were made.	States or corporations.	Termini of land-grant portion.			Remarks.
				From—	To—	Miles.	
1	Alabama and Chattanooga	Will's Valley and Northeast and Southwest.	Alabama	Wauhatchie, Tenn	State line Mississippi and Alabama.	270.5	
2	Atchison, Topeka and Santa Fé.	Atchison, Topeka and Santa Fé.	Kansas	Atchison, Kans	The State line	470.58	
3	Atlantic and Pacific	Atlantic and Pacific; with a branch from the Canadian River to western boundary of Arkansas, at or near Van Buren, Ark.	Corporation	Springfield, Mo., via Canadian River, Albuquerque, the Aqua Frio, and the Colorado River.	The Pacific Ocean		
4	Atlantic and Pacific	Southwest branch Pacific Railroad of Missouri.	Missouri	Saint Louis, Mo	Springfield, Mo	241	The Atlantic and Pacific and the Missouri Pacific railroads use same track from Saint Louis to Pacific.
5	Burlington and Missouri River.	Burlington and Missouri River	Iowa Nebraska	Burlington, Iowa Plattsmouth, Nebr	Missouri River Junction with Union Pacific Railroad, Nebraska.	279 191	
6	Chicago and Northwestern, (Iowa Division.)	Cedar Rapids and Missouri River	Iowa	Cedar Rapids, Iowa Branch, Lyons, Iowa	Missouri River, Iowa Clinton, Iowa	272 3	See Railway Guide (Iowa Midland Railroad) for branch from Lyons to Clinton.
7	Chicago and Northwestern, (Wisconsin Division.)	Chicago, Saint Paul and Fond du Lac.	Wisconsin	Fond du Lac, Wis	Wisconsin State line	117	
8	Chicago and Northwestern, (Peninsular Division.)	Bay de Noc and Marquette	Michigan	Wisconsin State line.	Marquette, Mich., via Escanaba.	137	
9	Chicago, Rock Island and Pacific.	Mississippi and Missouri	Iowa	Davenport, Iowa	Missouri River	310	
10	Central Pacific, (main line)	Pacific Railroad	Corporation	Ogden	Sacramento, Cal	743	
11	Central Pacific, (Western Division.)	Western Pacific	do	Sacramento, Cal	San Francisco, Cal	138	
12	Central Pacific, (Oregon Division.)	California and Oregon	California and Oregon.	Junction with Central Pacific.	Portland, Oreg		
13	Central Branch Union Pacific	Atchison and Pike's Peak	Corporation	Atchison, Kans	Waterville, Kans	100	
14	Chicago, Milwaukee and Saint Paul. (Iowa and Minnesota Division.)	Minneapolis and Cedar Valley, and Minnesota Central, Austin and State line.	Minnesota	Saint Paul, via Mendota, Faribault, and Austin. Minneapolis, via Mendota, Faribault and Austin.	Lyle, Minn do	112 115	*See Railway Guide (Iowa and Dakota Division) for distance from Austin to Lyle. Formerly Milwaukee and Saint Paul Railway.
15	Chicago, Milwaukee and Saint Paul. (Iowa and Dakota Division.)	McGregor and Sioux City, and McGregor and Missouri River.	Iowa	Calmar, Iowa	Junction with Saint Paul and Sioux City Railroad.		

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Table of land-grant railroads in the United States, &c.—Continued.

Number.	Present names of companies owning or operating the roads.	Original names of companies to which grants were made.	States or corporations.	Termini of land-grant portion.			Remarks.
				From—	To—	Miles.	
16	Chicago, Milwaukee and St. Paul, (La Crosse Division.)	La Crosse and Milwaukee	Wisconsin	Portage City, Wis	Tomah, Wis	62	Formerly Milwaukee and Saint Paul Railway.
17	Denver Pacific	Kansas Pacific	Corporation	Denver	Cheyenne	106	
18	Atlantic, Gulf and West India Transit Co.'s Railroad.	Florida	Florida	Fernandina, Fla	Cedar Keys	154	
19	Flint and Pere Marquette	Flint and Pere Marquette	Michigan	Flint, Mich	Lake Michigan, Mich		
20	Grand Rapids and Indiana	Grand Rapids and Indiana	Indiana and Michigan.	Fort Wayne, Ind	Petosky, on Traverse Bay, Mich.	332	Branch road from Walton to Traverse City is not a land-grant road.
21	Hannibal and Saint Joseph	Hannibal and Saint Joseph	Missouri	Hannibal, Mo	Saint Joseph, Mo	206	
22	Hastings and Dakota	Hastings, Minnesota River and Red River of the North.	Minnesota	Hastings	Western boundary of the State.		
23	Illinois Central, (main line)	Illinois Central	Illinois	Cairo, Ill	Dunleith Ill	456	
24	Illinois Central, (Chicago branch.)	Illinois Ceutral	do	do	Chicago, Ill	365	Branch road commences at Centralia.
25	Illinois Central, (Iowa Division.)	Dubuque and Sioux City, and Iowa Falls and Sioux City.	Iowa	Dubuque	Sioux City	326	
26	Jackson, Lansing & Saginaw	Amboy, Lansing and Traverse Bay.	Michigan	Amboy, Mich	Straits of Mackinaw		Operated by Michigan Central Railroad Company. That portion of the Jackson, Lansing and Saginaw Railroad between Jackson and Lansing is not a land-grant railroad.
27	Jacksonville, Pensacola and Mobile.	Florida, Atlantic and Gulf Central, and Pensacola and Georgia.	Florida	Jacksonville, Fla	Quincy, Fla	189	
28	Kansas Pacific	Leavenworth, Pawnee & Western	Corporation	Kansas City, Mo	Denver, Col	639	
29	Little Rock and Fort Smith	Little Rock and Fort Smith	Arkansas	Little Rock, Ark	Fort Smith, Ark		
30	Lake Superior and Mississippi.	Lake Superior and Mississippi, and Saint Paul and Stillwater.	Minnesota	Saint Paul, Minn Branch from Great Bear.	Du Luth, Minn Stillwater, Minn	156 13	
31	Leavenworth, Lawrence and Galveston.	Leavenworth, Lawrence and Fort Gibson; with a branch from Lawrence to the Atchison, Topeka and Santa Fé Railroad.	Kansas	Leavenworth, Kans	South line of State	177.6	
32	Mobile and Ohio	Mobile and Ohio	Alabama and Mississippi.	Mobile, Ala	Columbus, Ky	472	
33	Mobile and Montgomery	Alabama and Florida	Alabama	Montgomery, Ala	Pollard, Ala	114	
34	Mobile and Girard	Mobile and Girard	do	Columbus, Ala	Troy, Ala	84	
35	Memphis and Little Rock	Memphis and Little Rock	Arkansas	Mississippi River	Little Rock, Ark	135	
36	Marquette, Houghton and Ontonagon.	Marquette and Ontonagon	Michigan	Marquette, Mich	Ontonagon, Mich		

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37	Missouri, Kansas and Texas	Union Pacific, (southern branch)	Kansas.....	Junction City, Kans	South boundary of Kansas, and to Fort Smith when the Indian title is extinguished.	182½	
38	Missouri Pacific Railroad ...	Southwest branch Pacific Railroad of Missouri.	Missouri	Saint Louis, Mo	Pacific, Mo.....	37	Operated by Atlantic and Pacific Railroad Company, lessee. Junction with Atlantic and Pacific Railroad, Pacific, Mo
39	Missouri River, Fort Scott and Gulf.	Kansas and Neosho Valley	Kansas.....	Kansas City, Mo ...	South line of Kansas..	161½	
40	Morgan's, Louisiana and Texas.	New Orleans, Opelousas and Great Western.	Louisiana	New Orleans, La	Brashear, La.....	80	
41	North Louisiana and Texas..	Vicksburg, Shreveport & Texas	....do	Delta, La.....	Monroe	72	
42	New Orleans, Baton Rouge and Vicksburg.	New Orleans, Baton Rouge and Vicksburg.	Corporation ...	New Orleans, La	Texas State line	.....	
43	Northern Pacific	Northern Pacific; with a branch via Columbia River to a point near Portland, Oregon.	....do	Lake Superior.....	Puget's Sound.....	.....	Transportation performed by the Northern Pacific Railroad Company between Duluth and Thomson's Station, (the junction of the Northern Pacific Railroad with the Lake Superior and Mississippi Railroad,) is subject to the conditions attached to the grant to the Lake Superior & Mississippi Railroad Company.
43½	Oregon and California.....	Oregon and California	Oregon.....	Portland, Oreg	Southern boundary of State.	.....	
44	Oregon Central	Oregon Central; with a branch from Fort Grove to Yamkill River, near McMinnville.	....do	...do	Astoria and McMinnville.	.....	Full payments may be made to this company.
45	Pensacola and Louisville	Alabama and Florida.....	Florida.....	Pensacola, Fla	Pollard, Ala.....	44	
46	South and North Alabama ..	Tennessee and Alabama Central	Alabama	Montgomery, Ala ...	Decatur, Ala	182	Operated in connection with the Louisville, Nashville and Great Southern Railway.
47	Selma, Rome and Dalton ...	Alabama and Tennessee, and Coosa and Tennessee.	....do	Selma, Ala	Eleven miles north of Jacksonville, Ala.	156	
48	Saint Louis, Iron Mountain and Southern.	Cairo and Fulton.....	Missouri and Arkansas.	Missouri River, opposite Cairo, via Poplar Bluff, Mo., and Little Rock, Ark.	Texas boundary at Texarkana.	395	
49	Saint Paul and Sioux City, and Sioux City and Saint Paul.	Minnesota Valley	Iowa and Minnesota.	Saint Paul, Minn....	Sioux City, Iowa.....	270	
50	Sioux City and Pacific	Sioux City and Pacific	Iowa and Nebraska.	Sioux City, Iowa	Fremont, Nebr	113	
51	Saint Paul and Pacific, (main line.)	Saint Paul and Pacific	Minnesota.....	Saint Paul, Minn....	Breckenridge, Minn...	217	
52	Saint Paul and Pacific, (branch.)	.....do	....do	Saint Paul, via Crow Wing.	Northern Pacific Railroad.	.....	
53	.....do	.....do	....do	Saint Paul, via Saint Cloud.	Pembina	.....	

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Table of land-grant railroads in the United States, &c.—Continued.

Number.	Present names of companies owning or operating the roads.	Original names of companies to which grants were made.	States or corporations.	Termini of land-grant portion. From—	To—	Miles.	Remarks.
54	Saint Joseph and Denver City	Northern Kansas	Kansas	Elwood, Kans	Junction with Union Pacific Railroad.		
55	Southern Pacific of California	Southern Pacific of California	California	San Francisco, Cal	Some point on the Atlantic and Pacific Railroad near the boundary line of California.		
56	Southern Pacific of California, (branch line.)	do	Corporation	From a point near Tehachapa Pass, via Los Angeles.	Texas Pacific Railroad, near the Colorado River.		
57	Southern Minnesota	Root River Valley and Southern Minnesota.	Minnesota	Mississippi River, opposite La Crosse.	Western boundary of the State.		
58	Texas and Pacific	Texas Pacific	Corporation	From a point near Marshall, Tex., via El Paso, to southern boundary of California, thence—	San Diego, Cal		
59	Utah Central	Utah Central	Territory of Utah.	Ogden, Utah	Salt Lake City, Utah	37	
60	Union Pacific	Pacific	Corporation	Omaha, Nebr	Ogden, Utah	882	
61	Vicksburg and Meridian	Southern Mississippi	Mississippi	Jackson, Miss	Meridian, Miss	95	
62	Winona and Saint Peter	Winona and Saint Peter	Minnesota	Winona, Minn	A point on the Big Sioux River.		
63	West Wisconsin	Tomah and Lake Superior	Wisconsin	Eleven miles south of Warrens, Wis.	Hudson, Wis	156	
64	Wisconsin Central	Portage, Winnebago and Lake Superior.	do	Portage City, via Stevens's Point.	Bayfield; thence to Lake Superior.		

NOTE.—See General Order No. 98, Adjutant-General's Office, of 1872, for conditions of grants.

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VI.—*Report of Capt. A. J. McGonnigle, Assistant Quartermaster, U. S. A.*

ASSISTANT QUARTERMASTER'S OFFICE,
Washington, D. C., August 17, 1874.

GENERAL: I have the honor to submit the following report of the operations of the Cemeterial Branch, Quartermaster-General's Office, during the fiscal year ended June 30, 1874.

The principal work performed during the year has been the construction of permanent walls and lodges. This work has, however, been greatly delayed, owing to the failure of the contractors to carry out their agreements. In several instances the Department has found it necessary to declare the contracts forfeited, and, by purchasing the requisite materials and hiring a sufficient force of mechanics, complete that which the contractors left unfinished. I am, nevertheless, enabled to report considerable progress in the matter of permanent improvements during the past year.

Brick inclosing-walls have been completed at the Memphis, Tenn.; Fort Leavenworth and Fort Scott, Kans.; Fort Smith, Ark., and Chalmette, La., national cemeteries. Work is also in progress on the walls at Fredericksburg, and Culpeper, Va.; Salisbury and Raleigh, N. C.; Port Hudson, La.; Fayetteville, Ark., and Vicksburg, Miss. All of these walls will probably be finished this fall. That at Raleigh is being completed by the Department, owing to the failure of the contractor.

Contracts were also executed for the construction of walls at the Fort Harrison and Poplar Grove, Va., and Baton Rouge, La., national cemeteries. Work, however, has not been commenced thereon, and the contracts for the two last cemeteries will be annulled.

An iron railing has been contracted for to inclose the Mound City, Ill., national cemetery, but, owing to delay in obtaining the approval of the Attorney General to the title to an additional strip of land upon which it is found necessary to erect the railing, the work on this contract has not yet been performed.

Superintendents' lodges have been erected at the national cemeteries at Memphis and Knoxville, Tenn.; Brownsville, Tex.; Fayetteville, Ark.; Danville, Glendale, and Seven Pines, Va., and Raleigh, N. C. The four latter have been finished by the United States.

Good progress is also being made in the construction of the lodges at Fort Leavenworth and Fort Scott, Kans., both of which it is expected will be completed this season.

According to the official reports received at this office, all of this work appears to have been well and substantially done, owing, doubtless, in great part, to the frequent and careful inspections made of the same while in progress. The results bear ample testimony to the wisdom of employing experienced engineers, who see that the contracts are faithfully carried out.

Contracts for building lodges at the Chattanooga and Wilmington national cemeteries and a wall at the New Berne cemetery were awarded last month, as this work could no longer be postponed. Building has by this time probably commenced.

Walls and lodges are also required at other cemeteries, with more or less urgency, but owing to the limited appropriation for the present fiscal year their construction has been necessarily deferred.

The national cemeteries at Baton Rouge, and Alexandria, La.; Andersonville, Ga.; Poplar Grove, Yorktown, Seven Pines, and Glendale, Va.;

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Fort Gibson, Ind. T.; Wilmington, N. C.; Fort McPherson, Nebr.; Beaufort and Florence, S. C.; Grafton, W. Va., and Brownsville, Tex., have yet to be provided with permanent inclosing walls.

Lodges are still required at Alexandria, Port Hudson, and Baton Rouge, La.; Camp Nelson, Lebanon, and Logan's Cross-Roads, Ky.; Pittsburg Landing and Fort Donelson, Tenn.; Fort Gibson, Ind. T.; Fort McPherson, Nebr.; Beverly, N. J.; Grafton, W. Va., and Andersonville, Ga.

A new lodge has also to be erected at the Chalmette national cemetery, by order of the Hon. Secretary of War.

The sum of $185,000 has been asked for to complete these permanent improvements, and it would, I think, be advantageous if the money were specially appropriated for this purpose and classed as a permanent appropriation. A few only of the walls and lodges should be built at a time, in order that frequent inspections may be made of each work while in progress, and more satisfactory results thereby secured.

In addition to the construction of walls and lodges, other needed improvements have been made, and the cemeteries generally are believed to be in a very fair condition. The subjects of water-supply and drainage have received special attention. Cisterns have been constructed and wells dug. The former are still required at several of the cemeteries, and provisions have been made for their construction during the present fiscal year. The plan recently adopted is for a brick underground cistern, with brick filtering-wall in center.

A thorough system of drainage has been completed at the Memphis cemetery, under the direction of Mr. James Gall, jr., civil engineer, and was reported upon favorably by the inspector of national cemeteries upon his recent visit to that cemetery. The system of drainage at many of the cemeteries yet remains to be perfected, but for want of the necessary funds the work cannot be done immediately.

The rains in Mississippi last spring caused considerable damage to the Vicksburg and Natchez cemeteries. A temporary increase of force was at once ordered for both places to repair the embankments, &c. This work is still going on at Vicksburg, where the damage was the greatest.

By the act of March 3, 1873, referred to in last annual report, the American burial-ground near the city of Mexico was designated a national cemetery. This cemetery has been greatly improved during the year. An artesian well has been sunk, and a supply of good water secured; the keeper's lodge has been enlarged and repaired, stable erected, and drives and walks graded; all having been done under the immediate supervision of Dr. Julius A. Skilton, United States consul-general, city of Mexico, to whom, by direction of the Secretary of War, has been intrusted the local management of the affairs of the cemetery and the disbursement of the funds allowed for its care and improvement. A keeper is employed, who is paid at the rate of $900 per annum, in currency. Labor is hired as required.

The Secretary of War having directed the establishment of a national cemetery at Fort McPherson, Nebr., a tract containing about 107 acres, within the limits of the Fort McPherson military reservation, has been set apart for this cemetery. Only 4 acres, however, will be used for the cemetery proper, and this lot has already been inclosed by a temporary wooden fence, to be replaced hereafter by a substantial stone wall. The work of removing the remains of deceased soldiers from Forts Sedgwick and Kearney, Nebr., was commenced last fall and is still in progress. A superintendent has been appointed for this cemetery.

The expenditures on account of the national cemeteries during the

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past fiscal year, as shown by the reports of the several disbursing officers, amounted in the aggregate to $267,493.20, as follows:

Walls	$86,973 40
Lodges	38,761 60
Rent of quarters	809 06
Out-houses	4,989 82
Green-houses	4,260 31
Trees, plants, &c	7,021 37
Employés	51,740 26
Drainage	17,254 18
Office-furniture	1,598 20
Tools, &c	6,212 27
Improvements of grounds	10,737 51
Flag-staffs and monuments	12,498 09
Water-supply	4,902 09
Purchase of land	1,201 12
Interments	966 17
Miscellaneous	17,600 60
Total	267,526 05

A more detailed account of these expenditures will be found in the accompanying statement marked A, which includes disbursements from appropriations both for the last and former fiscal years.

The appropriation for the past year was $275,000; the balance remaining unexpended in the hands of officers and in the Treasury will be required to pay for work performed under contracts executed during the fiscal year.

The limited appropriation for the care of the cemeteries during the present year, namely, $150,000, renders the utmost economy imperatively necessary. A specified sum has been allotted to each cemetery, and the local officer in charge has in each instance been advised thereof, and has been informed further as to the several purposes to which the sum thus allotted is to be applied. It is hoped that the system thus inaugurated will tend to greater efficiency and economy in the management of affairs relating to the national cemeteries.

Numerous requests have been received for assistance in caring for the several soldiers' lots in private cemeteries. These requests it has been found impracticable to comply with for want of the necessary funds. Two lots owned by the United States have, however, by direction of the honorable Secretary of War, been inclosed with iron railings during the past year, namely, the soldiers' lot in the Lebanon Cemetery, Philadelphia, Pa., and the soldiers' lot in the Forest Hill Cemetery, Madison, Wis. No provision has yet been made for erecting permanent headstones in any of the soldiers' lots except that in the Woodlawn Cemetery, Elmira, N. Y. The act of February 22, 1867, and the several acts amendatory thereof, provide only for the erection of permanent head-stones in the national cemeteries.

The number of bodies interred in national cemeteries up to June 30, 1874, are as follows:

National cemeteries in—	Known.	Unknown.
New York	3,578	78
New Jersey	140	7
Pennsylvania	3,849	1,627
Maryland	4,130	379
District of Columbia	5,377	281
Virginia	35,217	38,211

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Statement of number of bodies interred in national cemeteries, &c.—Cont'd.

National cemeteries in—	Known.	Unknown.
West Virginia	633	620
North Carolina	3,447	14,217
South Carolina	4,903	7,290
Georgia	19,839	3,994
Alabama	745	112
Florida	744	657
Texas	1,590	1,486
Mexico	220	
Louisiana	10,029	10,034
Mississippi	5,017	19,348
Arkansas	3,927	4,646
Indian Territory	199	2,097
Kansas	962	862
Nebraska	79	181
Iowa	609	21
Illinois	3,793	3,082
Missouri	9,751	3,526
Indiana	2,806	712
Kentucky	7,546	2,507
Tennessee	32,923	23,987
Total	162,079	130,962

In the foregoing statement the interments in the post and private cemeteries are not included.

On September 6, 1873, the bids received in response to the advertisement of the Quartermaster-General, dated June 27, 1873, inviting proposals for furnishing and erecting head-stones for the graves of Union soldiers interred in national cemeteries, were opened at the office of the Quartermaster-General.

The design for the head-stones had previously been adopted by the Secretary of War, by whom also the contracts were awarded, as follows:

To Thomas P. Morgan, of Washington, D. C., for marble head-stones for the known graves in 22 cemeteries, at $3.40 each.

To Charles S. Jones, of Washington, D. C., for marble head-stones for the known graves in 23 cemeteries, at $3.39 each.

To Samuel S. Bridges, of Keokuk, Iowa, for marble head-stones for the known graves in 26 cemeteries, at $3.56 each.

To E. P. Doherty, of Washington, D. C., for granite head-stones and blocks for the known and unknown graves in the Fredericksburg cemetery, at $3.95 and $3.50 each, respectively.

To D. C. Sage, of Cromwell, Conn., for marble blocks for the unknown graves in 72 cemeteries, at $2.40 each.

The execution of these contracts was completed December 31, 1873. None of the head-stones have, however, yet been erected.

In the preparation of the lists of graves requiring these head-stones, the names and the numbers of the graves are first taken by the civil engineers employed by the Department, from the head-board at each grave, and the lists thus prepared are transmitted to this Office for revision and correction, which has been and is now being conducted with the utmost care, no pains being spared to secure as accurate inscriptions for the head-stones as the means at command will permit. In this work the published reports of the Adjutants General of the several States have been of great assistance.

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A few of the States, however, have not published the official record of their soldiers who served during the war of the rebellion. To such, application has been made for needed information, and to the Adjutants General of Ohio, Missouri, Pennsylvania, and New York the Department is largely indebted for valuable data furnished from time to time, when applied for. Nor should it be omitted to acknowledge special obligations to the Adjutant General of Vermont for a revised roll of honor of deceased volunteer soldiers from that State, whose remains are interred in national cemeteries.

By an act approved March 3, 1873, the sum of $10,000 was appropriated for the erection of a granite monument at the Salisbury national cemetery.

Several artists, upon invitation of the Quartermaster-General, submitted designs, from which the selection was made by the Secretary of War. Proposals for furnishing and erecting the monument in accordance with the design adopted were advertised for May 6, 1874. Five bids were received, four of which were within the amount appropriated. The award was made by the Secretary of War to the lowest bidder, and the matter of the execution of the contract is now pending.

A thorough examination of the records in the matter of title to the ground occupied as national cemeteries has been made. For some of the cemeteries no deeds for the land have yet been obtained, and in many cases the required cession of jurisdiction to the United States over the land thus occupied has not been granted by the State Legislatures. Whatever action seemed to be necessary in the cases has been taken, and the attention of the officer in charge of the cemeteries has been called to the subject, and instructions given to take such steps as may be best calculated to secure the desired legislation at an early date.

Superintendents are now required at 69 national cemeteries; 65 were on duty July 1, 1873. Nine were appointed and 6 were discharged during the fiscal year, leaving 68 in service June 30, 1874.

Very respectfully, your obedient servant,

A. J. McGONNIGLE,
Capt. and A. Q. M., U. S. Army.

The QUARTERMASTER GENERAL, U. S. ARMY.

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A.—*Statement of disbursements of appropriations for national cemeteries during the fiscal year ending June* 30, 1874.

Name of cemetery.	Walls.				Lodges.			Rent of quarters.	Out-houses, (sheds, stables, &c.)	Green-houses.	Trees, plants, &c.
	Construction.	Coping and guttering.	Repair.	Gates.	Construction.	Addition.	Repair.				
Albany Rural											
Alexandria, La											$141 00
Alexandria, Va							$114 30		$43 65	$35 00	39 50
Andersonville, Ga											
Annapolis, Md			$311 10				50 37		12 84	54 15	251 50
Antietam, Md											
Arlington, Va		$1,105 75	7,255 83	$81 01			43 31		798 05	2,887 73	468 49
Ball's Bluff, Va											
Barrancas, Fla							322 50	$12 00			94 50
Battle-Ground, D. C			1 75				94 50			19 00	25 20
Baton Rouge, La							17 50				
Baxter Springs, Kans											
Beaufort, S. C						$39 87	5 00	216 00	201 26		106 95
Beverly, N. J				20 00				54 00			3 20
Brattleborough, Vt											
Brownsville, Tex					$2,627 91		30 00				370 00
Camp Butler, Ill			63 85				140 00		39 40		41 75
Camp Nelson, Ky							13 00				
Cave Hill, Ky							11 92				50 00
Chalmette, La	$15,403 97								228 60		
Chattanooga, Tenn			2,571 80	11 40							90 00
City Point, Va		3,279 49		3 00		875 00	75 00		37 50	19 25	216 05
Cold Harbor, Va			4 10		48 26	657 39	194 35				76 50
Corinth, Miss			566 00	14 00			29 65				58 00
Crown Hill, Ind											85 00
Culpeper, Va	1,497 60		7 00				9 00		6 00		276 90
Cypress Hills, N. Y						26 83	119 75				
Danville, Va				23 00	2,279 28		68 51				230 29
Fayetteville, Ark	1,760 56				508 00						82 40
Florence, S. C							16 38		114 00		55 00
Forest Hill, Wis	2,139 00										
Fort Donelson, Tenn							20 00				
Fort Gibson, Indian Ter											47 50
Fort Harrison, Va						603 00	7 37				114 40
Fort Leavenworth, Kans	2,164 43	903 56		165 00	823 50						88 00
Fort McPherson, Nebr											

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Fort Scott, Kans	3,886 27	318 45						45 00			
Fort Smith, Ark	8,301 00						53 00		95 00		30 25
Fredericksburg, Va	2,656 90					1,000 00	79 00	174 00		951 37	444 50
Gettysburg, Pa							2 50		258 00		126 00
Glendale, Va					2,448 04			121 33	35 00		93 50
Gratton, W. Va									48 50		38 50
Hampton, Va							2 50		118 00		286 75
Jefferson Barracks, Mo			127 75	6 00			115 00		1 50		50 00
Jefferson City, Mo			13 75				54 25		153 13		25 00
Keokuk, Iowa							82 40		864 33		227 00
Knoxville, Tenn				17 62	4,564 00				38 19		
Laurel, Md											
Lebanon, Ky							48 60				75 00
Lexington, Ky											
Little Rock, Ark			266 00						517 40		878 25
Logan's Cross-Roads, Ky									4 07		32 00
London Park, Md								75 00			
Marietta, Ga							7 50		17 50		75 00
Memphis, Tenn	16,641 86			560 00	2,850 00				270 81		
Mexico, Mex						4,000 00					
Mobile, Ala							325 00				
Mound City, Ill							20 00		5 00		
Nashville, Tenn			670 50				84 75				8 00
Natchez, Miss											93 75
New Albany, Ind									17 00		80 30
New Berne, N. C			5 75		3,330 00				215 00		68 02
Philadelphia, Pa	535 00							54 00			12 00
Pittsburg Landing, Tenn				225 00							
Poplar Grove, Va									8 75		88 30
Port Hudson, La	1,264 00						3 50				
Quincy, Ill											
Raleigh, N. C	2,409 55		3 80			241 00	51 00		129 00		79 15
Richmond, Va	548 22	2,530 35					560 00	27 73	61 10	43 50	443 25
Rock Island, Ill											
Salisbury, N. C	2,199 01						9 75		2 50		62 25
San Antonio, Tex			105 90				142 90		198 66		95 00
Seven Pines, Va					4,759 91				215 00		
Soldiers' Home, D. C							94 50		44 30	110 31	54 02
Springfield, Ill			769 00				27 05		14 98		30 00
Staunton, Va				4 00			1,083 00		150 80		50 20
Stone's River, Tenn			401 60	15 00							3 00
Vicksburg, Miss						994 00				140 00	208 70
White Hall, Pa	3,137 92										
Wilmington, N. C											150 00
Winchester, Va											22 00
Yorktown, Va					650 00	20 00	1,190 00	30 00	25 00		79 55
Total	64,545 29	8,137 60	13,145 48	1,145 03	24,888 90	8,454 09	5,418 61	809 06	4,989 82	4,260 31	7,021 37

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A.—*Statement of disbursements of appropriations for national cemeteries, &c.*—Continued.

Name of cemetery.	Employés.	Drainage.	Barrack and office furniture.	Tools and miscellaneous.	Improvement of grounds.	Flag-staffs and monuments.	Water-supply.	Purchase of land, examining titles, &c.	Interments.	Total.
Albany Rural	$25 00									$25 00
Alexandria, La	551 66			$123 15		$40 00	$125 00	$3 00		1,033 81
Alexandria, Va	1,278 75	$168 45	$52 00	30 01	$199 75	129 39	59 67			2,210 47
Andersonville, Ga	951 68		38 00	124 54		75 00				1,189 22
Annapolis, Md	534 37		92 00	125 77	52 50	75 00	59 41			1,619 01
Antietam, Md						75 00				75 00
Arlington, Va	6,030 62	196 50	28 75	184 71	440 00	75 00	75 59			19,671 34
Ball's Bluff, Va	116 00					75 00				191 00
Barrancas, Fla	408 92		35 00	21 70		100 00	55 50			1,050 12
Battle-Ground, D. C	102 00		25 00		34 20	75 00				376 65
Baton Rouge, La	1,032 98	1,706 25	37 50	29 60		90 00				2,913 83
Baxter Springs, Kans						171 00				171 00
Beaufort, S. C	1,421 49		17 00	139 57	44 25	79 15	5 50		$60 75	2,336 79
Beverly, N. J	139 30		52 25	113 89	25 26	79 00	54 00			540 90
Brattleborough, Vt	50 00									50 00
Brownsville, Tex	762 32		4 00	193 75		100 00		75 00		4,162 98
Camp Butler, Ill	326 20	$64 01	29 95	88 32	369 40	634 40	32 78			2,630 05
Camp Nelson, Ky	237 25		23 00	48 32		301 23		5 00		627 80
Cave Hill, Ky	368 10			2 90	7 50	75 00			6 00	521 42
Chalmette, La	2,393 27		8 00	124 12		356 45				18,514 41
Chattanooga, Tenn	1,388 67		25 00	149 29		357 00				4,593 16
City Point, Va	513 66		25 00	111 69	226 00	78 70		25 00		5,485 34
Cold Harbor, Va	222 33	25 00	45 25	20 46	37 50	325 00	8 00	1 00		1,665 14
Corinth, Miss	799 80		61 00	119 57	59 00	559 00				2,266 62
Crown Hill, Ind				33 25	55 00	715 00				803 25
Culpeper, Va	730 00	260 12	57 00	158 20	496 67	159 20	4 00			3,661 69
Cypress Hills, N. Y	671 00			90 77	18 00	91 35			9 00	1,026 70
Danville, Va	360 66	59 00	21 00	43 75	81 75	209 00		227 07		3,603 31
Fayetteville, Ark	233 86			88 77	48 13	81 75		351 75		3,155 22
Florence, S. C	375 00		23 00	114 45	9 00	184 25			6 00	997 08
Forest Hill, Wis										2,139 00
Fort Donelson, Tenn	150 00		12 00	115 22		357 70				654 92
Fort Gibson, Indian Ter	235 00		30 00	31 30		75 00			188 00	606 80
Fort Harrison, Va	296 66	240 00	35 25	6 70	66 25	93 00		74 00		1,533 63
Fort Leavenworth, Kans	952 00			9 00		75 00				5,180 49
Fort McPherson, Nebr	2,435 00				675 25				89 75	3,220 00
Fort Scott, Kans	91 50			9 38	22 75	75 00		145 10		4,593 45
Fort Smith, Ark	1,415 60	397 50	15 00	68 58		80 00				10,455 85

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Fredericksburg, Va	887 49	18 00	35 00	64 24	621 19	435 00	1 50			7,368 19
Gettysburg, Pa	982 98		8 00	61 70	875 35	334 44	105 00			2,753 97
Glendale, Va	241 65	15 00	1 00	44 82	62 50	77 50	81 87			3,222 21
Grafton, W. Va	180 62		8 00	34 70	19 25	130 85				460 42
Hampton, Va	513 98		14 00	58 69		77 50				1,071 42
Jefferson Barracks, Mo	867 75	708 68	20 00	45 63	2 00	80 75	591 35			2,615 81
Jefferson City, Mo	491 00	47 75	16 35	90 03	202 00	124 80	608 30		400 67	2,227 03
Keokuk, Iowa		9 33		18 05	453 56	135 00				1,790 57
Knoxville, Tenn	250 50		25 00	31 47		75 00			15 00	5,016 78
Laurel, Md	35 00									35 00
Lebanon, Ky	169 00		8 00	31 06		79 25				410 91
Lexington, Ky						588 90				368 90
Little Rock, Ark	1,131 99	3,653 27	40 00	105 74	1,519 26	367 55	674 00			9,153 16
Logan's Cross Roads, Ky	225 00		8 50	12 83	17 50	77 75	5 75			383 40
London Park, Md	123 33		36 25	45 05	15 00	83 10				377 73
Marietta, Ga	614 17		36 00	42 14		89 35	45 00		137 00	1,063 66
Memphis, Tenn	1,567 00	6,845 83	29 65	429 30		75 00				20,369 35
Mexico, Mex	796 19			532 03	880 00		1,700 00			7,908 22
Mobile, Ala	400 00		25 00	75 30		79 00				904 30
Mound City, Ill	453 19	87 50	20 00	124 64	245 62	79 65	15 00	3 20		1,053 80
Nashville, Tenn	1,203 50	353 00	12 00	216 98	719 60	155 35	5 00			3,427 98
Natchez, Miss	852 67	15 00		223 70	88 00	75 00				1,348 12
New Albany, Ind	358 50			60 50	50 00	75 00				641 30
New Berne, N. C	296 00		20 00		15 00	77 75	201 68			4,229 30
Pittsburg Landing, Tenn	651 35			53 06	2 50					1,307 91
Philadelphia, Pa	588 00		25 00	98 96	48 00	876 75				1,861 71
Poplar Grove, Va	572 16		46 00	84 24	158 00	408 13				1,365 58
Port Hudson, La	995 00		37 50	39 00	95 00	83 15				2,517 15
Quincy, Ill	24 75				15 00	360 90				420 65
Raleigh, N. C	350 00		32 95	73 23	21 25	84 35		134 50		3,609 78
Richmond, Va	860 48	1,060 00	34 00	56 81	506 80	80 00			44 00	6,856 94
Rock Island, Ill					33 50	75 00				108 50
Salisbury, N. C	236 66		9 00	36 98	30 00	152 50	19 89	38 95		2,796 09
San Antonio, Tex	270 95		28 20	18 75			35 50			895 16
Seven Pines, Va	144 16	482 00	31 00	49 94	7 50	75 00		118 95		5,872 76
Soldiers' Home, D. C	875 00		25 00	3 00	50 00	90 00	218 67			1,564 80
Springfield, Ill	576 50	8 00	21 25	112 84	404 76	95 25	24 13			2,083 76
Staunton, Va	298 00	34 60	20 00	53 52	6 00	75 00	10 00			1,785 12
Stone's River, Tenn	606 00		45 00	174 57		75 00	65 00			1,385 17
Vicksburg, Miss	3,216 33			259 02	476 96	75 00			10 00	5,380 01
White Hall, Pa	130 30									3,968 23
Wilmington, N. C	500 00			93 09	115 50	75 00				933 59
Winchester, Va	322 00		43 60	45 00		77 30				509 90
Yorktown, Va	261 16		55 00	91 61	12 75	115 00	15 00			2,545 07
Total	51,740 26	17,254 18	1,598 20	6,212 27	10,737 51	12,498 09	4,902 09	1,301 12	966 17	249,925 45

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A.—*Statement of disbursements of appropriations for national cemeteries, &c.*—Continued.

MISCELLANEOUS DISBURSEMENTS.

Total from preceding table		$249,925 45
Hire of clerks, engineers, draughtsmen, &c	$16,106 61	
Advertising	349 95	
Engineers' instruments	524 14	
Books, postage, stationery, &c	430 25	
Transportation	132 65	
Rent of office at Nashville, Tenn	57 00	
		17,600 60
Total disbursed during the year		267,526 05

Respectfully submitted.

A. J. McGONNIGLE,
Captain and Assistant Quartermaster, United States Army.

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REPORT OF COMMISSARY-GENERAL OF SUBSISTENCE.

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REPORT

OF THE

COMMISSARY-GENERAL OF SUBSISTENCE.

WAR DEPARTMENT,
OFFICE COMMISSARY-GENERAL OF SUBSISTENCE,
Washington, D. C., October 10, 1874.

SIR: In compliance with the directions of the honorable Secretary of War, communicated in the circular to the chiefs of Bureaus of the War Department, of September 8, 1874, I have the honor to submit the report of the operations of the Subsistence Department for the last fiscal year.

Stores for the subsistence of the Army have in a great measure been procured in the large markets, but the Department has availed itself of the productions of the country in the vicinity of posts, when articles of proper quality could be advantageously purchased. Beef has been procured by contract, and, when practicable, delivered at the posts from the block.

The officers of the Subsistence Department are stationed at the market centers of the country convenient to the location of troops, and at the headquarters of military divisions and departments, and, under existing laws and the orders of the Secretary of War, are charged with the procurement and distribution of the necessary supplies.

The average cost of the complete ration for the fiscal year ended June 30, 1874, at ten principal points of purchase, was as follows:

Months.	New York, N. Y.	Baltimore, Md.	Louisville, Ky.	Saint Louis, Mo.	Saint Paul, Minn.	Omaha, Nebr.	Fort Leavenworth, Kans.	Chicago, Ill.	New Orleans, La.	San Francisco, Cal.
1873.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
July	16.88	19.99	15.22	16.65	16.19	16.13	17.69	14.33	16.18	16.51
August	18.60	20.27	15.26	17.30	16.48	16.33	18.74	14.81	17.38	16.52
September	18.13	20.77	15.71	15.38	16.45	14.84	18.09	14.78	17.81	16.70
October	16.57	20.07	15.48	16.20	16.27	15.31	17.20	14.55	16.74	16.48
November	20.98	19.71	15.36	15.08	14.52	15.31	16.25	14.56	16.30	17.25
December	18.52	20.15	15.57	16.12	14.23	15.24	17.06	14.48	18.36	17.26
1874.										
January	18.89	21.73	15.57	16.38	14.09	14.65	16.87	14.48	18.55	17.38
February	16.61	21.57	15.99	17.21	14.82	14.97	16.87	14.06	18.65	17.29
March	15.99	21.12	16.17	15.38	14.33	16.00	18.08	14.33	18.81	16.81
April	15.98	21.71	16.17	16.80	14.56	15.79	18.05	14.93	18.26	16.49
May	16.36	21.52	16.17	16.63	12.99	15.99	17.87	14.20	17.73	16.64
June	17.29	21.66	15.77	17.69	14.80	16.07	17.88	14.21	17.33	18.92
Average	17.56	20.85	15.70	16.40	14.98	15.55	17.55	14.48	17.67	17.02

Under the authority of section 6 of the act of Congress approved March 3, 1869, the Subsistence Department has, in the fiscal year, furnished tobacco at cost prices to enlisted men of the Army, to the value of $142,999.07, making the monthly average $11,916.59.

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Within the fiscal year, there were received from 441 officers of the Army who performed duty in the Subsistence Department, 2,819 accounts-current, 2,667 returns of provisions, and 993 returns of commissary property, a total of 6,479 accounts-current and returns; and within the same period, 3,219 accounts-current, 3,069 returns of provisions, and 1,175 returns of commissary property, a total of 7,463 accounts-current and returns, were examined in this office and forwarded to the Third Auditor of the Treasury for final settlement.

Under the act of June 23, 1870, as extended by the act of June 7, 1872, and still further extended for one year by the act approved June 18, 1874, credits have been recommended in the cases of 22 officers in the sum of $7,960.27, making the total number of officers relieved under the operation of the acts cited 789, in the total amount of $224,517.83.

Under the third section of the act of July 4, 1864, 310 claims, amounting to $235,956.85, for subsistence supplies alleged to have been used by the Army or taken by officers for the use of the Army, in the late war, in States not in rebellion, were filed in this office for examination; 73 claims, amounting to $66,712.93, were examined and recommended to the Third Auditor of the Treasury for payment; and 109 claims, amounting to $129,327.49, were examined and rejected.

Under the joint resolution of Congress of July 25, 1866, and section 3 of the act of March 2, 1867, 175 certificates for commutation of rations to Union soldiers while prisoners of war were received and paid to the claimants or their legal heirs. These payments amounted to $5,739.75.

I recommend that the act of March 3, 1873, authorizing the appointment of commissary-sergeants, be so amended as to allow the Secretary of War to select said sergeants from the enlisted men of the Army. The present mode of selection unjustly discriminates against a class of clerks and assistants who for years have been detailed on duty in the Subsistence Department, and, in fact, are the only enlisted men in the Army who are thoroughly familiar with the duties.

It is respectfully recommended that section 25 of the act entitled "An act to increase and fix the military peace establishment of the United States," approved July 28, 1866, be amended to read as follows, viz:

And be it further enacted, That the Subsistence Department is hereby authorized to furnish for sale, at cost prices, to officers, for the use of themselves and their families, and to commanders of companies or other military organizations, for the use of the enlisted men of such companies or organizations, such articles as may from time to time be designated by the Commissary-General of Subsistence, with the approval of the Secretary of War.

Under the operation of section 5 of the act entitled "An act making appropriations for the legislative, executive, and judicial expenses of the Government for the year ending June thirtieth, eighteen hundred and seventy-three, and for other purposes," approved May 8, 1872, and the act amendatory thereof, approved June 8, 1872, the proceeds of sales of condemned supplies, of sales to other departments of the Government, and of sales of every nature, excepting to officers and soldiers of the Army, and exploring or surveying expeditions authorized by law, are required to be covered into the Treasury; and that the annual appropriation for subsistence of the Army is thus virtually reduced by this amount, which, ordinarily, is not inconsiderable.

The unceasing demand for subsistence, and its indispensable character in connection with the comfort, health, and efficiency of the Army, render it imperative that there shall be no failure or deficiency in the supply, either in quantity or variety. It is a matter of grave importance, therefore, that the annual appropriation for subsistence of the Army shall not be impaired by having a part thus diverted back into the Treasury,

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as revenue, without accomplishing any useful effect, and that the whole amount thereof shall be made available for the object for which the appropriation is made by Congress. In view of the foregoing considerations, it is respectfully recommended that a general law be passed exempting the proceeds of all sales of subsistence supplies from being covered into the Treasury, and making them immediately available for the purchase of fresh supplies to replace those sold.

I would respectfully call attention to the fact that supplies for posts on the headwaters of the Missouri River, for the fiscal year 1875–'76, must be purchased and prepared for shipment in time to take advantage of the "June rise" of that stream; and that a similar necessity for advance purchases and shipments exists with regard to Fort Pembina and distant posts in Texas and Arizona. As under existing laws, no part of the appropriation for the fiscal year ending June 30, 1875, can be applied to the purchase of the supplies referred to, it is recommended that the following proviso be added to the subsistence section of the act making appropriations for the support of the Army for the fiscal year ending June 30, 1876, viz:

Provided, That three hundred thousand dollars of the money thus appropriated may be applied by the Commissary-General of Subsistence, prior to the first day of July, eighteen hundred and seventy-five, to the purchase of supplies required for advance shipments to posts on the Upper Missouri, Fort Pembina, and distant posts in Texas and Arizona.

By the act entitled "An act to provide for the relief of the persons suffering from the overflow of the Mississippi River," approved April 23, 1874, and the acts supplementary thereto, approved May 13, 1874, and June 23, 1874, and the joint resolution approved May 28, 1874, extending the provisions of those acts to the sufferers from overflow on the Tombigbee, Warrior, and Alabama Rivers, appropriations were made amounting in the aggregate to $590,000.

In compliance with the requirements of the laws making these appropriations, issues of food to the sufferers from overflow on the rivers named were discontinued on the 1st day of September, 1874.

The report of Capt. Thomas C. Sullivan, commissary of subsistence, United States Army, the officer charged with the duty of purchasing and distributing the food, will be transmitted as soon as prepared.

Very respectfully, your obedient servant,

A. E. SHIRAS,
Commissary-General of Subsistence.

Hon. WILLIAM W. BELKNAP,
Secretary of War.

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REPORT OF THE SURGEON-GENERAL.

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REPORT

OF

THE SURGEON-GENERAL.

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, October 1, 1874.

SIR: I have the honor to submit the following statement of finances and general transactions of the Medical Department of the Army for the fiscal year ending June 30, 1874:

FINANCIAL STATEMENT.

The funds subject to the requisitions of the Medical Bureau during the year ending June 30, 1874, were:

I. Appropriation for the relief of sick and discharged soldiers, under the act approved July 5, 1862:		
Balance remaining July 1, 1873	$10,357	74
Disbursed during the year	848	53
Balance June 30, 1874	9,509	21
II. Appropriation under act of March 3, 1869, to enable the Secretary of the Treasury to settle the accounts of disbursing officers:		
Balance remaining July 1, 1873	$6,658	98
Transferred during the year	6,658	98
III. Appropriation under act of March 3, 1873, to enable the Secretary of the Treasury to settle the accounts of disbursing officers:		
Balance remaining July 1, 1873	$275,000	00
Transferred during the year	66,592	51
Balance June 30, 1874	208,407	49
IV. Appropriation for the Medical and Hospital Department of the Army for the time prior to July 1, 1870:		
Balance remaining July 1, 1873	$723,779	58
Received from sales	5,817	47
Refundment made in Treasury settlement	1,299	00
	730,896	05
Disbursed during the year	13,224	52
Balance June 30, 1874	717,671	53
V. Appropriation for the Medical and Hospital Department for the fiscal year ending June 30, 1871:		
Balance remaining July 1, 1873	$30,272	87
Refundment made in Treasury settlement	2	48
	30,275	35
Disbursed during the year	20,778	93
Balance June 30, 1874	9,496	42

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VI. Appropriation for the Medical and Hospital Department for the fiscal year ending June 30, 1872:

Balance remaining July 1, 1873	$7,003 88
Refundment made in Treasury settlement	5 78
	7,009 66
Disbursed during the year	723 07
Balance June 30, 1874	6,286 59

VII. Appropriation for the Medical and Hospital Department for the fiscal year ending June 30, 1873:

Balance remaining July 1, 1873	$47,696 80
Received from sales	5 00
	47,701 80
Disbursed during the year	28,391 54
Balance June 30, 1874	19,310 26

VIII. Appropriation for the Medical and Hospital Department for the fiscal year ending June 30, 1874:

Appropriation under act approved March 3, 1873	$200,000 00
Disbursed during the year	175,839 08
Balance June 30, 1874	24,160 92

IX. Appropriation for the support of the Army Medical Museum and Library of the Surgeon-General's Office, under act of June 6, 1872:

Balance remaining July 1, 1873	$1,140 74
Disbursed during the year	1,140 74

X. Appropriation for the support of the Army Medical Museum and Library of the Surgeon-General's Office, under act approved March 3, 1873

	$10,000 00
Disbursed during the year	9,483 98
Balance June 30, 1874	516 02

XI. Appropriation for completing the Medical and Surgical History of the War, under act of June 8, 1872:

Balance remaining July 1, 1873	$47,293 88
Refunded from the appropriation for the medical and surgical history and statistics, act of July 28, 1866	1,000 00
	48,293 88
Disbursed during the year	28,145 22
Balance June 30, 1874	20,148 66

XII. Appropriation for furnishing appliances to disabled soldiers, act of June 6, 1872:

Balance remaining July 1, 1873	$8,801 38
Disbursed during the year	267 50
Balance June 30, 1874	8,533 88

XIII. Amount expended under the act of May 23, 1872, to provide for furnishing trusses to ruptured soldiers $5,541 21

Number of trusses furnished during the year, 602.

Number of artificial limbs allowed during the fiscal year:

	In kind.	*By commutation.*
Arms	4	71
Legs	15	28
Feet	1	12
Apparatus		374
	20	485

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HEALTH OF THE ARMY DURING THE FISCAL YEAR ENDING JUNE 30, 1874.

Notwithstanding the occurrence of a few cases of yellow fever at Forts Jefferson and Barrancas during the summer of 1873, the Army enjoyed unusual good health during the year.

The monthly reports of sick and wounded received at this Office represent an average mean strength of 25,647 white, and 2,497 colored troops.

Among the white troops the total number of cases of all kinds reported as taken on the sick-list was 45,911, being at the rate of 1,790 per 1,000 of mean strength. (That is rather less than two entries on sick-report during the year for each man.) Of this number 38,827 cases, or 1,514 per 1,000 of strength, were taken on sick-report for disease, and 7,084 cases, or 276 per 1,000 of strength, for wounds, accidents, and injuries of all kinds.

The average number constantly on sick-report during the year was 1,190 men, or 46 per 1,000 of mean strength. Of these 938 men, or 36 per 1,000 of strength, were constantly under treatment for disease, and 252 men, or 10 per 1,000 of strength, for wounds, accidents and injuries.

The total number of deaths reported from all causes was 341, or 13 per 1,000 of mean strength. Of these 229, or 9 per 1,000 of strength, died of disease, and 112, or 4 per 1,000 of strength, of wounds, accidents, and injuries. The proportion of deaths from all causes to cases treated was 1 to 135.

The total number of white soldiers reported to have been discharged the service on "surgeon's certificate of disability" was 874, being at the rate of 34 per 1,000 of mean strength.

Among the colored troops, the total number of cases of all kinds reported was 4,535, being at the rate of 1,816 per 1,000 of mean strength. Of these, 3,843 cases, or 1,539 per 1,000 of mean strength, were cases of disease, and 692 cases, or 277 per 1,000 of strength, were wounds, accidents, and injuries.

The average number constantly on sick-report was 130 men, or 52 per 1,000 of mean strength, of whom 101 men, or 40 per 1,000, were under treatment for disease, and 29 men, or 12 per 1,000, for wounds, accidents, and injuries.

The total number of deaths reported from all causes was 37, or 15 per 1,000 of mean strength. Of these, 25, or 10 per 1,000 of mean strength, died of disease, and 12, or 5 per 1,000, of wounds, accidents, and injuries. The proportion of deaths from all causes to cases treated was 1 to 123.

The total number of colored soldiers reported to have been discharged on "surgeon's certificate of disability" was 59, or 24 per 1,000 of mean strength.

The large number of men reported to have been discharged on surgeon's certificate of disability is worthy of some remark.

Of the 874 discharges of white soldiers, 138 were on account of wounds, accidents, and injuries, and 736 on account of disease. Of the latter class chronic bronchitis and consumption caused 118 discharges; rheumatism, 74; constitutional syphilis, 73; disease of the heart, 68; alcoholism, 46; hernia, 35; epilepsy, 29; and diarrhœa and dysentery, 20.

Of the 59 discharges of colored soldiers, 11 were on account of wounds, accidents, and injuries, and 48 on account of disease. Of the latter class consumption caused 5 discharges; rheumatism, 3; constitutional

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syphilis, 2; disease of the heart, 7; hernia, 4; epilepsy, 8; and dysentery, 1.

Adding together the deaths and discharges for disability, the total loss to the Army during the year was 47 per 1,000 of strength for the white, and 39 per 1,000 for the colored troops. If these figures are compared with the reports of the previous five years, from July 1, 1868, to June 30, 1873, inclusive, it will be seen that the chief difference is a diminution in the losses of the colored troops last year.

The average losses of the Army by deaths and discharges for disability, during the five years referred to, have been 47 per 1,000 of strength for the white troops, and 52 per 1,000 for the colored. These losses have been distributed as follows: In the case of the white troops, deaths from disease, 10, deaths from wounds, accidents, and injuries, 5, discharges from disability, 32 per 1,000 of strength. In the case of the colored troops, deaths from disease, 15, deaths from wounds, accidents, and injuries, 5, discharges from disability, 32 per 1,000 of strength.

It would appear, therefore, that the comparatively large loss of the Army from discharges on surgeon's certificate of disability is not an accident of the past year, but that it has been of constant occurrence for the last six years.

Large as these losses have been, however, we cannot consider them excessive, if we compare them with the losses from the same causes in the army of Great Britain. It appears from the report of the army medical department that the average losses by death and discharges for disability among the troops stationed in the United Kingdom during the ten years from 1861 to 1870, inclusive, were 43.21 per 1,000 of strength, of which 9.45 were deaths, and 33.76 discharges; and although, as shown by the same reports, the ratio of discharges during the ten years was much smaller in the case of the troops serving in India, viz, 19 per 1,000 of strength, yet this was balanced by a greater mortality, viz, 21.3 for Bombay, 22.62 for Madras, and 29.67 for Bengal.

In the case of our own Army, we cannot fail to note the large proportion of both deaths and discharges due to wounds, accidents, and injuries. The mortality from this class of causes is especially deserving of comment. For the last six years it has averaged about 5 deaths per 1,000 of strength for both white and colored troops, while by the English reports above referred to, it appears that during the six years from 1866 to 1871, inclusive, the mortality from all causes of the same class was only 1 death per 1,000 of strength for the troops serving in the United Kingdom, and 2.37 per 1,000 for the troops serving in India.

Of the 112 deaths from wounds, accidents, and injuries, reported among our white troops during the last fiscal year, 23 were homicides, 14 suicides, and 30 are reported to have been accidentally drowned.

Homicide in the Army.—The number of deaths above given represents a ratio of 90 per 100,000 of strength. During the previous five years, from July 1, 1868, to June 30, 1873, inclusive, 121 homicides were repo ted among the white troops, the average annual ratio for that period being 83 homicides per 100,000 of mean strength.

Among the colored troops the number of homicides reported during the last fiscal year was 2, or 80 per 100,000 of mean strength; during the previous five years 42 homicides were reported among the colored troops, the average annual ratio for that period being 254 per 100,000 of mean strength.

These figures are strikingly in excess of the proportion of homicides in the English army. During the six years, from 1866 to 1871, inclu-

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sive, there were but 9 homicides reported among the troops serving in the United Kingdom, with a strength ranging between seventy and a hundred thousand men, the average annual ratio being only 2 homicides per 100,000 of mean strength. Among the troops serving in India, with a strength ranging between fifty-three and fifty-nine thousand, the total number of homicides reported during the six years was 18, the average annual ratio being rather more than 5.33 per 100,000 of mean strength.

Suicide in the Army.—Of the 14 suicides reported during the last fiscal year among the white troops, 10 were by gunshot, 2 by drowning, and in 2 the manner is not specified. The number corresponds to a ratio of 54 per 100,000 of mean strength. During the previous five years 90 suicides were reported among the white troops, the average annual ratio for the five years being 63 per 100,000 of mean strength.

Among the colored troops suicides have been much more infrequent, none having been reported during the last fiscal year. During the previous five years only 4 suicides were reported among the colored troops; the average annual ratio for the five years being 26 per 100,000 of mean strength.

The ratios for the white troops are larger than those reported in the English army for the troops serving in the United Kingdom, which, during the six years, from 1866 to 1871, inclusive, averaged annually 36 per 100,000 of mean strength; they even exceed the ratios reported during the same years for the troops serving in India, which averaged 55 per 100,000 of mean strength.

Accidental drowning in the Army.—Of the 30 white soldiers reported to have been accidentally drowned during the last fiscal year, 5 were drowned by the upsetting of the Government ferry-boat at Fort Gibson, Indian Territory, April 20, 1874, and 5 are reported to have been intoxicated when drowned. Among the remainder such entries as the following may be noted on the list of deaths: "Drowned while crossing the Platte River with his company;" "Drowned while attempting to cross the Colorado River;" "Drowned while attempting to cross the Gila River;" "Drowned while watering his horse in the Missouri River," &c. The whole number represents a ratio of 117 per 100,000 of mean strength, During the previous five years 145 white soldiers are reported to have been accidentally drowned; the average annual ratio for the five years being 100 per 100,000 of mean strength.

Among the colored troops the number reported to have been accidentally drowned during the last fiscal year was 6, being at the rate of 240 per 100,000 of mean strength. During the previous five years, however, only 5 colored soldiers are reported to have been drowned; the average annual ratio for the five years being 29 per 100,000 of mean strength.

The ratios above given for the white troops and for the colored troops, last year, are very greatly in excess of those reported in the English army, in which during the six years, from 1866 to 1871, inclusive, the average annual ratio of deaths by accidental drowning was 28 per 100,000 of mean strength for the troops serving in the United Kingdom, and 40 per 100,000 for the troops serving in India.

LIMITED OCCURRENCE OF YELLOW FEVER AMONG THE TROOPS.

During the summer of 1873 yellow fever appeared as an epidemic at various cities in the Southern States, assuming at some points a most malignant type, and proving exceedingly fatal; as, for example, at Memphis, Tenn., and at Shreveport, La. That it did not prevail to a

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greater extent in the Army must be regarded to have been due chiefly to the hygienic precautions adopted, and especially to the prompt removal of the troops from those posts at which the disease was actually introduced from infected localities, or at which its introduction appeared to be imminent.

At Fort Jefferson, Fla., the disease made its appearance among the garrison (Company M, First Artillery) during the latter part of August. So soon as its nature was fully recognized, the greater portion of the command was removed, under charge of a non-commissioned officer, to Loggerhead Key, two miles and a half distant, leaving behind, besides the sick with the medical officers and hospital attendants, a small detachment of men under Lieut. James E. Bell, the commanding officer of the post.

During the first five days after this step was taken, four of the men on Loggerhead Key were taken sick with yellow fever, and were promptly sent back to the fort, after which this portion of the command remained free from the disease, while almost every man who remained at Fort Jefferson was attacked. The total number of cases among the troops was 25, of whom 13 died; and there were besides several cases among citizen employés. Lieutenant Bell, who was the only commissioned officer at the post when the disease made its appearance, and who, when he sent the majority of the command to Loggerhead Key, remained behind and took an active part in the care of the sick, was attacked on the 8th of September, and died on the 11th, a victim to his conscientious ideas of duty.

The medical officers on duty at Fort Jefferson, when the epidemic made its appearance, were Acting Assistant Surgeons Joseph Y. Porter and F. J. Gould. So soon as the existence of the disease was known, Assistant Surgeon Harvey E. Brown was ordered to the post by the Medical Director, and arrived there September 6. The manner in which these gentlemen discharged their duties is worthy of all praise, and the same may be said of Dr. Joseph Otto, of Key West, who, on the outbreak of the epidemic, volunteered his services, and hastened to Fort Jefferson, where he rendered valuable assistance.

At Key West, Fla., the disease having made its appearance in the harbor, and an unmistakable case having occurred in the town, the command at Key West Barracks (Companies E and I, First Artillery) was removed on the 16th of September to Camp Dallas, at the mouth of the Miami River, and escaped without a single case.

Similar good fortune attended the command at Mobile, Ala., (headquarters, band, staff, and Companies G and K, Second Infantry,) which, so soon as cases of yellow fever were known to exist in the city, was removed, September 19, to Mount Vernon Barracks.

At Fort Barrancas, Fla., even after the disease had become epidemic in the city of Pensacola, it was hoped that it might be excluded from the command (Companies A, F, and L, First Artillery) by strict non-intercourse. This, however, proved unavailing, and two cases of yellow fever having made their appearance in the garrison, the greater portion of the troops were removed to Santa Rosa Island, and went into camp near Fort Pickens, less than two miles distant, leaving a small detachment at Barrancas. No cases occurred at Santa Rosa Island, but several in the detachment which remained at Barrancas, the total number of cases among the enlisted men being 12, with 4 deaths. There were also six cases and two deaths at the post among the citizens attached to the command.

Great credit is due to the post surgeon at Fort Barrancas, Assistant

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Surgeon George M. Sternberg, for the faithful manner in which he discharged his duties during the epidemic, and to the commanding officer of the post, Maj. John M. Brannan, of the First Artillery, for the hearty manner in which he co-operated with the post surgeon in his efforts to save the command from the disaster by which it was threatened.

WORK PERFORMED IN THE RECORD AND PENSION DIVISION.

The number of official demands for information as to causes of death of deceased soldiers, and the hospital record of invalids, instead of diminishing, as anticipated, was actually greater than during the previous year. The total number of applications for such information during the fiscal year terminating June 30, 1873, was 16,601, of which 1,553 remained unanswered at the close of the year. From that time to June 30, 1874, 17,957 new applications for information were recorded, of which 11,481 were from the Commissioner of Pensions, 6,067 from the Adjutant-General of the Army, and 409 from miscellaneous sources. These new cases added to those remaining from the previous year made 19,510 cases to be disposed of during the last fiscal year.

Search was made, and replies furnished to the proper authorities, in 18,535 of these cases, viz: 11,884 to the Commissioner of Pensions, 6,244 to the Adjutant-General of the Army, and 407 to miscellaneous applicants, leaving 975 unsearched cases on hand on the 1st of July, 1874.

The total number of applications for the class of information referred to above received at this Office from the 1st of July, 1865, to the 30th of June, 1874, has been 259,757, of which 258,782 have been finally disposed of. Of these terminated cases 81,284 were from the Adjutant-General of the Army, 153,207 from the Commissioner of Pensions, 11,972 from the Paymaster-General, and 12,319 from miscellaneous sources. The information thus furnished has been used for the most part in the adjustment of pension and other claims against the Government, and has served both as an aid in establishing the merit of worthy claims, and as a protection to the Government against fraudulent ones.

It is to be remarked, not only that the number of these cases received during the last fiscal year was larger than the number received during the previous year, but that of late a considerable proportion of the applications received have been unusually difficult to search, partly because of the larger number of cases in which it is necessary to trace the soldier through several hospitals, and partly on account of the increasing frequency with which the data furnished by claimants prove to be incomplete or inaccurate. The latter source of trouble grows greater, even in just claims, as time elapses since the close of the war.

DIVISION OF SURGICAL RECORDS.

According to the annual report for the year ending June 30, 1873, there were entered on the registers of this division, up to that date, 219,873 cases of wounds and injuries, and 40,034 histories of surgical operations. During the year ending June 30, 1874, 2,624 surgical cases and 92 histories of operations were added, making an aggregate of 222,497 surgical cases, and of 40,126 operations, a grand total of 262,623 histories at present on the records of this division.

In 11,273 cases additional information was obtained, and results were determined from the records on file in this Office, and in 3,573 cases the remote results of wounds and injuries were ascertained from the records of the Pension-Office.

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Six thousand and forty-five reports, letters, and indorsements were received, indexed, and filed.

The data for the descriptive anatomical catalogue have been perfected. The publication of this work, recommended by the Secretary of War and by the House of Representatives, was not acted on by the Senate. The materials are so arranged that the work can be speedily completed when authority to print is granted, and I would respectfully renew the recommendation made in my previous annual reports, that authority be given to publish one thousand copies of the work.

The following report, No. 56, from the Committee on Military Affairs of the House of Representatives, dated February 4, 1873, sets forth more fully the reasons for the above request:

[Report to accompany bill H. R. 3453.]

The Committee on Military Affairs, to whom was referred H. R. 3453, entitled "A bill to provide for the printing at the Government Printing Office of one thousand copies of the Descriptive Anatomical Catalogue of the Army Medical Museum," have had the same under consideration, and submit as a statement of the facts in the case, and as reasons for the passage of the accompanying bill, the following communications from the Surgeon-General, which are made a part hereof:

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, January 18, 1873.

SIR: In reply to your letter of the 17th instant, asking for a "statement of the facts going to show the importance of printing the Descriptive Anatomical Catalogue of the Army Medical Museum," contemplated in the bill H. R. 3453, I have the honor to represent that it is mainly through the printed catalogues that the collections of the museum are made available to scientific students, the majority of whom cannot personally examine them. Catalogues of the surgical, medical, and microscopical sections have been already printed, and their distribution has resulted, not only in widely diffusing a knowledge of the contents of the museum relative to those subjects, but in large voluntary contributions to the collections. These have now attained such importance, that few recent works on military medicine, surgery, and hygiene have omitted to refer largely to the rich and reliable stores of information gathered within the walls of the museum.

It is now proposed to print an *anatomical* catalogue, in which the most important feature will be the craniological chapter. The measurement and comparison of human skulls is an interesting and difficult branch of the natural history of man, which has of late received much attention in the scientific world. It is a study that can only be pursued by a few anatomists, having access to large collections of crania, and the requisite experience and skill to measure accurately. Craniology, established as a science by Blumenbach and Camper, was prosecuted in this country by Morton with great success. His work was published by subscription. The medical officers of the Army have collected a much larger series of American skulls than have ever before been available for study. The collection embraces many ancient crania from caves and tumuli, from Greenland and Alaska to Florida and Arizona, and specimens from the majority of the existing tribes of Indians, and of the extinct tribes of the historic period. These, as well as a sufficient series of skulls of the white and black races, have been carefully measured and figured by orthographic drawings, so that the dimensions may be verified. Anthropologists in different parts of the world are anxious for the data thus accumulated for comparison with similar data published in Sweden, Russia, Germany, Italy, France, and England. The French government through its legation here, after making repeated applications for the tables of cranial measurements, employed an artist to make casts and take photographs of a series of typical skulls; and a professor of Bonn made the study of the collection the object of a trip across the Atlantic. I mention these facts as an indication of the importance of the collection in the eyes of foreign savants; but it is especially with a view of enabling scientific students in our own country to utilize the collection that I urge the publication of this catalogue.

In addition to the unique collection of crania, the anatomical cabinet possesses a good series of preparations and drawings of the various organs of the body, properly classified and catalogued. To render these accessible to students a printed catalogue is simply a necessity.

I take what I trust may be esteemed a pardonable pride in the reflection that this important collection has been accumulated through the almost unaided zeal and industry of the medical officers of the Army, and, I was about to say, entirely without cost to the Government. It is true, however, that a few preparations have been obtained by purchase, but by far the largest proportion have been collected by the medical officers, or procured in exchange for objects of ethnological interest collected by them.

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If the members of the committee will contrast the results obtained with the small annual appropriation of $5,000 for the Army Medical Museum with the condition of foreign national museums, and the large sums annually voted them, the progress here accomplished would be appreciated, the results being possible only because the labor has been performed, as incidental to their legitimate duties, by those already in the Government service.

I have restricted myself to a concise statement of the importance of the proposed catalogue. Should the members of the committee desire more details, I would respectfully suggest that Assistant Surgeon Otis, who is familiar with them, should be granted a hearing before the committee.

I am, sir, very respectfully, your obedient servant,

J. K. BARNES,
Surgeon-General, United States Army.

HON. JOHN COBURN,
Chairman Committee on Military Affairs.

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, D. C., January 24, 1873.

SIR: I have the honor to forward the following estimate of cost of printing and binding catalogue of the anatomical section of the Army Medical Museum, viz:

For 1,000 copies:

Plates and wood-cuts	$20,000
Paper, composition, and printing	2,700
Binding, in cloth	1,000
Binding, in leather	2,500

For 5,000 copies the cost will be:

For plates	$38,000
Paper, composition, and printing	7,500
Binding, in cloth	5,000
Binding, in leather	12,500
Total cost, 1,000 copies, in cloth	23,700
Total cost, 5,000 copies, in cloth	50,500

Very respectfully, your obedient servant,

J. K. BARNES,
Surgeon-General, United States Army.

HON. JOHN COBURN,
Chairman Military Committee, House of Representatives.

The committee recommend the passage of the accompanying bill.

ARMY MEDICAL MUSEUM.

One thousand one hundred and eighty-five specimens were added to the various sections.

Surgical section.

Specimens in the museum July 1, 1873	6,272
Specimens in the museum July 1, 1874	6,447
Increase	175

Medical section.

Specimens in the museum July 1, 1873	1,168
Specimens in the museum July 1, 1874	1,225
Increase	57

Microscopical section.

Specimens in the museum July 1, 1873	6,095
Specimens in the museum July 1, 1874	6,738
Increase	643

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Anatomical section.

Specimens in the museum July 1, 1873	995
Specimens in the museum July 1, 1874	1,119
Increase	124

Section of comparative anatomy.

Specimens in the museum July 1, 1873	1,270
Specimens in the museum July 1, 1874	1,404
Increase	134

Miscellaneous section.

Specimens in the museum July 1, 1873, (received 92; transferred 40)	134
Specimens in the museum July 1, 1874	186
Increase	52

Twenty specimens were donated to the Smithsonian Institution, nineteen to the Peabody Museum, and one to the Agricultural Department, and five hundred and ten photographs were presented to scientific men and institutions. Two hundred and sixty-four calculi were analyzed and the results of the analyses recorded. Eight hundred and forty-seven crania were measured and the measurements recorded.

The Army Medical Museum was visited during the year ending June 30, 1874, by 26,071 persons.

MISCELLANEOUS.

Of the second part of the Medical and Surgical History of the War 700 pages have been printed, and nearly all the plates have been prepared.

In accordance with the act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1874, and for other purposes, approved June 23, 1874, proposals have been obtained for preparing the plates for a new edition of 5,000 copies, which have been approved by the honorable Secretary of War, and the work is now in progress. That part of the work now going through the press is being stereotyped. Legislation is necessary to authorize the Congressional Printer to print an additional edition of 5,000 copies from the commencement of the work, and I respectfully recommend that such authority be given.

The library of this Office continues to increase in size and usefulness; about 5,000 volumes have been added to it during the past year. The printing of the Alphabetical Catalogue of Authors has been completed, and a subject-catalogue is now in course of preparation.

In accordance with the joint resolution of Congress approved March 25, 1874, Assistant Surgeon Ely McClellan, United States Army, was detailed to inquire into, and report upon, the causes of epidemic cholera, and was instructed to visit the towns and localities in the United States at which cholera prevailed during the year 1873. His report is now in course of preparation, and will be in readiness by the time of the meeting of Congress.

In the re-organization of the force of this Office by the act making appropriations for the legislative, executive, and judicial expenses of the Government for the fiscal year ending June 30, 1875, and for other purposes, approved June 20, 1874, no provision was made for the continued

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employment of the chemist and his assistant. I have in consequence been compelled to suspend work in the laboratory, thus depriving this Department of the protection and advantage of careful and reliable analyses of drugs and medicines, and making it impossible to furnish, as heretofore, other Departments of the Government with results of examinations for detection of adulterations, or establishment of values, for guidance in selection and purchase.

During the month of June, 1874, an arrangement was made with the Chief Signal-Officer of the Army by which the monthly reports of the meteorological observations made at the several military posts by the medical officers of the Army were to be forwarded to him, hereafter, as received at this Office. This proposition was made in the belief that these observations possess considerable value, and that their utility will be increased by studying them in connection with the observations made under the auspices of the Signal Corps.

The requirements of the Army as to medical officers is shown by the following statement:

Number of permanent posts	174
Number of temporary posts and substations	36
Total	210
Number of medical officers on special duty as medical directors of departments; at Soldiers' Home; preparing reports ordered by Congress; in the Surgeon-General's Office; and on medical examining boards now in session	23
Number of contract surgeons on duty as attending surgeons at recruiting stations and in cities not reckoned as posts	14
Number of posts at which two or more medical officers are required*	45
Number of military expeditions during the current year	13
Number of scouting-parties	67

With the thirteen expeditions, twenty-five medical officers were required; with the sixty-seven scouting-parties, forty medical officers were on duty.

The average number of medical officers absent on leave and on account of sickness is twelve.

To meet the above demands there are now in service fifty-one surgeons, ninety-four assistant surgeons, and one hundred and eighty-seven contract surgeons; in all, three hundred and thirty-two.

The act re-organizing the staff corps of the Army, approved June 23, 1874, while allowing appointments of assistant surgeons in the Army, cuts off two of the five lieutenant-colonels and ten of the sixty majors, thus preventing any promotion for several years to come. This is much to be regretted, as it places the officers of the Medical Corps below those of all the other staff corps and of the line of the Army, as regards promotion, which is felt by them as a hardship and injustice, the results of which cannot fail to be injurious to the best interests of the service.

The clause of the same act which specifies that "the number of contract surgeons shall be limited to seventy-five on or before the first day of January, in the year eighteen hundred and seventy-five, and thereafter no more shall be employed," must result either in actual suffering for want of medical attendance, or in largely increased expense to the Government. The number of candidates presenting themselves before the examining-boards for the position of assistant surgeon is not large, and probably not more than twenty-five will pass the examination by the first of January, to take the place of over one hundred contract surgeons to be discharged under the above law. The only resource will be

* The number of medical officers required at a post is fixed by the department commander.

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to employ local physicians without contracts and pay them the ordinary fees of private physicians, which past experience has shown will cost much more and be less satisfactory than the present system.

At date of last report there existed sixty-four vacancies in the Medical Corps, viz, two assistant medical purveyors, five surgeons, fifty-six assistant surgeons, and one medical store-keeper.

During the past year three surgeons and one surgeon (retired) have died, and one surgeon has resigned; the vacancies in the grades of assistant medical purveyor, surgeon, and medical store-keeper were abolished by act of Congress approved June 23, 1874, leaving at present fifty-six vacancies in the grade of assistant surgeon.

J. K. BARNES,
Surgeon-General, United States Army.

The Hon. SECRETARY OF WAR.

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REPORT OF THE PAYMASTER-GENERAL.

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REPORT

OF

THE PAYMASTER-GENERAL.

PAYMASTER-GENERAL'S OFFICE,
Washington, October 10, 1874.

SIR: I have the honor to submit my annual report of the transactions of the Pay Department of the Army for the last fiscal year ending 30th June, 1874.

Tabular statements herewith inclosed show in detail the fiscal operations of the Department for that year, summarily stated as follows:

RECEIPTS AND DISBURSEMENTS.

Balance on hand at the beginning of the fiscal year, (July 1, 1873)...		$2,152,991 81
Received during the fiscal year from the Treasury		14,241,096 12
Received from soldiers' deposits		346,609 56
Received from other sources		697,043 94
Total		17,437,741 43
Disbursed to the Army	$11,782,168 86	
Disbursed to the Military Academy	195,928 47	
Disbursed on Treasury certificates	1,284,733 11	
Total disbursements		$13,262,830 44
Surplus funds deposited in Treasury		837,794 85
Paymasters' collection deposited in Treasury		697,442 30
Balance in hands of Paymasters June 30, 1874, to be accounted for in next report		2,639,673 84
Total		17,437,741 43

In reporting to you the operations of the Pay Department for the last year, I am bound to say that it has been impossible, with the present force of paymasters, to pay the troops at some posts as promptly and as regularly as the laws and regulations contemplate. Communications to the Headquarters of the Army and the War Department through all the intermediate commanders have within a few weeks been referred to this Office, from several department commanders, making application for more paymasters and explaining the reasons for the same. These communications come from the commanders of the Departments of Dakota, Texas, The Columbia, The Missouri, and the major-general commanding the Division of the Pacific. The General commanding the Army has just shown me the annual report of the last-named officer, who says: "The business of the several staff departments" (in the Division of the Pacific) "has been conducted in a satisfactory manner, with due regard to economy and the general interests of the public service. In the Pay Department this has been accomplished only by extraordinary efforts on the part of the too small number of officers of that Department."

Thus all that I said in my last annual report as to the necessity of

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more officers for this Department has now renewed an additional significance. I trust that at the coming session of Congress, the sixth section of the act of March 3, 1869, will be repealed, enabling the Executive to appoint some more officers to this Department.*

It is necessary to add, also, that this legislation should extend to all grades in the Department. There are two vacancies of Deputy Paymaster-General with the rank of lieutenant-colonel. When the interdict above mentioned is repealed, the two senior paymasters will be entitled to promotion. The organization of the Pay Department in the eighteenth section of the act of July 28, 1866, (vol. 14, p. 335, Statutes at Large,) should be revived except as to the number of paymasters; thus providing for a Paymaster-General with the rank of brigadier-general, two Assistant Paymaster-Generals with the rank of colonel, two Deputy Paymaster-Generals with the rank of lieutenant-colonel, and at least fifty paymasters. The act of June 4, 1872, (vol. 17, p. 219, Statutes at Large,) gave authority to the President to fill the then existing vacancy of Paymaster-General with the rank of colonel. The legislation of the recent act of June 23, 1874, "re-organizing the several staff corps of the Army," should be extended to the Pay Department. Said act provides that the Judge-Advocate-General, the Surgeon-General, the Chief of Ordnance, and the Commissary-General shall hereafter (as in the act of July 28, 1866) have the rank of brigadier-general. I respectfully submit that the rank of Paymaster-General should also remain of that grade.

One of the most critical and onerous duties of all officers of the Department is not only the prompt execution of all laws, but the carrying out of all the manifold interpretations of those laws, requiring the exercise of the utmost vigilance. No one not familiar with the accumulation of new legislation on such points and the necessary volumes of interpretations of the same, would realize the amount of study and caution required in those duties, and how little propriety there would be in intrusting them to temporary appointments.

I shall not go over the ground of my letter to you of 25th March, 1874, setting forth my objections to the scheme of paying the troops by checks, which was sent by you to the House of Representatives, and printed in a document of that body.

The number of re-enlistments during the last year has been fourteen hundred more than during the previous fiscal year. And I am pleased to learn from the Adjutant-General that there has been, during the last year, a considerable reduction in the number of desertions from the Army. During the fiscal year ending June 30, 1874, there were twenty-six hundred less desertions than during the fiscal year ending June 30, 1873. Little of this reduction is due to the diminution of the number of enlisted men, but it is fair to presume that a large share of it is owing to the increasing contentment with the service, by the full operation of the acts of May 15, 1872, for gradual increase of pay, and for soldiers' deposits. Under the first-named act an enlisted man will receive, on the expiration of his first enlistment, $72 of retained pay, and which he cannot receive until he is discharged.

All the deposits are forfeited by desertion, and their number and total amount has constantly increased. The total deposited in the fiscal year ending June 30, 1874, was $346,609. The total deposited in the fiscal year ending June 30, 1873, was $209,850—show-

* For a full tabular "Statement showing posts visited, miles traveled, and time consumed by each officer of the Pay Department in making the regular bimonthly payments to the troops," see speech of General Albright, of Pennsylvania, Congressional Record, May 29, 1874, page 38.

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ing an increase of 65 per cent. The monthly deposits the last year were $28,884; during the previous year, $17,488; increase per month, $11,396. The number of deposits has more than doubled. During the last year the number was 4,971; during the former year 2,217. Thus the number of small deposits has increased, as well as the number of soldiers who have availed themselves of the privilege.

Several of the regimental and company commanders justly recommend that the interest given for deposits should be 6 per cent., which was the rate allowed in a similar scheme as it originally passed the Senate. It costs the Government more than 4 per cent. to raise money, and the improvement in the *morale* of the troops should be taken into consideration.

The average amount of deposits per company during the year has been largest in the Department of Arizona, viz, $1,876.66; next in Department of the Missouri, $1,299.89; next in Department of Dakota, $1,208.64. As occurred the previous year, the deposits have been largest where the troops have been most in the field for active operations.

I recommend to favorable consideration an annuity scheme for officers of the Army, first presented to you by General J. B. Fry, of the Adjutant-General's Department, which I understand was sent from your Office to Congress. Under it officers could, by making certain monthly ded tions from their pay, secure to their widows, heirs, or nominees monthly annuity, which will commence on the death of the officer. It is contemplated that the operation shall in the end be a safe one for the Government and shall involve no loss to the Treasury. It contemplates that the War Department shall have power to prescribe from time to time the rules and tables to be employed in the execution of the plan. These tables should be based on the most thorough scientific principles; and if, after a long series of years, it should be found that they will not perfectly fulfill the above-named programme, a change should of course be made in said tables. But it would require many years to give them a full trial.

I have caused a careful calculation to be made of the annual death-rate of officers of the Army for the last fifty years. The casualties were not entered in the Army Register until 1824, or I should have gone further back. I find that the average annual mortality of officers of the United States Army (including deaths in war) has been 24.1 per thousand. The principal parallel statistics which I have found is that the average annual death-rate among males over twenty-one years of age in England and Wales, from 1841 to 1851, was 21 per thousand. The exact fraction of the population reached was .02104. (Calculated from statistics in English Life-Tables, pp. 18 and 19.)

In some of the governments on the continent of Europe officers of their armies are not permitted to marry unless evidence is exhibited of ability to support and maintain a family. Such arbitrary rules do not at all suit the genius of our people or of our institutions; but the substitute proposed by this scheme would tend to secure similar ends by the voluntary action of the officers.

Two things are proverbial in our Army: that married officers are as distinguished as other officers for gallantry and heroism; but it is also too true that sometimes those renowned for the most brilliant deeds are habitually improvident. It is not expected that legislatures can in this respect change the nature of soldiers and sailors, but a machinery would be prepared gradually to counteract such habits. It is proposed that

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the deductions from pay shall be monthly and therefore imperceptible, (in comparison with yearly payments;) and thus an easy way of avoiding improvidence would be at hand, and the Army would have within itself the means of adding to its prestige and dignity, and of diminishing the calls upon Congress for extra and private legislation.

It is believed that it would be enlightened legislation to adopt a scheme whereby an officer would be encouraged to take such a step, and thus to secure for his heirs some annuity, whatever may be the risks of his profession. Such action always increases the pride and self-respect of the officer, and would nerve his arm in time of war. Thus the Government is incited to such legislation not alone by humanitarian considerations, but by the policy of increasing the efficiency of the service.

The act of May 8, 1874, authorizes leaves of absence on full pay for periods of more than thirty days to officers "on duty at any point west of a line drawn north and south through Omaha City, and north of a line drawn east and west upon the southern boundary of Arizona." I submit the propriety of extending the provisions of that act to the whole of Texas. Some of the most remote posts are now excluded from its benefits.

Respectfully submitted.

BENJ. ALVORD,
Paymaster-General, U. S. A.

The Hon. SECRETARY OF WAR.

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Statement, by appropriations, showing the amount in hands of officers of the Pay Department and unaccounted for on July 1, 1873; the amounts received by them from the Treasury and from all other sources during the fiscal year ending June 30, 1874; also the amount accounted for by vouchers of expenditures, by deposit and replacement in the Treasury, and the balance remaining unaccounted for on June 30, 1874.

Appropriations.	Balance in hands of paymasters July 1, 1873.	Received from Treasury in the year ending June 30, 1874.	Soldiers' deposits during the year.	Received from paymasters' collections.	Amount of credit transfers.	Total to be accounted for.	Surplus funds deposited in Treasury.	Paymasters' collections deposited in Treasury.	Amount of debit transfers.	Amount of disbursements.	Total accounted for.	Balance in hands of paymasters June 30, 1874.
DEFINITE.												
Prior to July 1, 1871.												
Pay of the Army	$12,338 55	$44,789 70	.....	$110 00	$584 84	$57,823 09	$5,324 36	.....	$24 44	$35,326 48	$40,675 28	$17,147 81
Pay of two and three years' volunteers	18,064 05	399,000 00	.....	42 79	50 02	417,156 86	.....	.....	.....	238,021 73	238,021 73	179,135 13
Bounty to volunteers, their widows, and legal heirs	47,974 73	1,199,750 00	.....	177 00	.....	1,247,901 73	.....	.....	.....	657,332 56	657,332 56	590,569 17
Total	78,377 33	1,643,539 70	.....	329 79	634 86	1,722,881 68	5,324 36	.....	24 44	930,680 77	936,029 57	786,852 11
For fiscal year ending June 30, 1872.												
Pay of the Army	95,675 43	26,500 00	.....	.....	.....	122,175 43	71,125 56	$1 06	178 56	19,072 51	90,377 69	31,797 74
Mileage	9,146 49	.....	.....	.....	4 40	9,150 89	8,578 42	.....	.....	112 30	8,690 72	460 17
General expenses	3,587 70	.....	.....	.....	20 04	3,607 74	2,732 08	.....	26 92	529 12	3,288 12	319 62
Pay of the Military Academy	459 96	.....	.....	.....	.....	459 96	459 96	.....	.....	.....	459 96	.....
Total	108,869 58	26,500 00	.....	.....	24 44	135,394 02	82,896 02	1 06	205 48	19,713 93	102,816 49	32,577 53
For fiscal year ending June 30, 1873.												
Pay of the Army	1,784,761 17	106,700 00	.....	6 30	9,293 96	1,900,761 43	654,687 48	228 06	6,121 73	1,199,824 66	1,860,861 93	39,899 50
Mileage	32,654 14	.....	.....	.....	321 30	32,975 44	20,531 14	.....	586 80	10,863 90	31,981 84	993 60
General expenses	25,257 21	400 00	.....	.....	574 94	26,232 15	14,314 49	.....	58 56	11,511 72	25,884 77	347 38
Pay of the Military Academy	27,471 06	.....	.....	.....	.....	27,471 06	3,282 22	.....	.....	23,882 91	27,165 13	305 93
Total	1,870,143 58	107,100 00	.....	6 30	10,190 20	1,987,440 08	692,815 33	228 06	6,767 09	1,246,083 19	1,945,893 67	41,546 41
For fiscal year ending June 30, 1874.												
Pay and traveling and general expenses of the Army	.....	11,902,711 00	$346,609 56	.....	6,081 36	12,255,401 92	56,759 14	35 00	9,933 85	10,516,269 57	10,582,997 56	1,672,404 36
Pay of the Military Academy	.....	201,000 00	.....	.....	.....	201,000 00	.....	.....	.....	172,045 56	172,045 56	28,954 44
Total	.....	12,103,711 00	346,60 956	.....	6,081 36	12,456,401 92	56,759 14	35 00	9,933 85	10,688,315 13	10,755,043 12	1,701,358 80

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Statement, by appropriations, showing the amount in hands of officers of the Pay Department and unaccounted for on July 1, 1873, &c.—Continued.

Appropriations.	Balance in hands of paymasters July 1, 1873.	Received from Treasury in the year ending June 30, 1874.	Soldiers' deposits during the year.	Received from paymasters' collections.	Amount of credit transfers.	Total to be accounted for.	Surplus funds deposited in Treasury.	Paymasters' collections deposited in Treasury.	Amount of debit transfers.	Amount of disbursements.	Total accounted for.	Balance in hands of paymasters June 30, 1874.
INDEFINITE.												
Bounty act July 22, 1866	$90,067 18	$325,000 00	.....	.....	.....	$415,067 18	.....	.....	.....	$343,218 67	$343,218 67	$71,848 51
Traveling expenses California and Nevada volunteers	4,854 41	34,285 56	.....	.....	.....	39,139 97	.....	.....	.....	33,784 67	33,784 67	5,355 30
Traveling expenses First Michigan Cavalry	74 22	959 86	.....	.....	.....	1,034 08	.....	.....	.....	1,034 08	1,034 08	.....
Total	94,995 81	330,245 42	.....	.....	.....	455,241 23	.....	.....	.....	378,037 42	378,037 42	77,203 81
Paymasters' collections	605 51	.....	.....	$696,707 85	.....	697,313 36	.....	$697,178 18	.....	.....	697,178 18	135 18
Grand total	2,152,991 81	14,241,096 12	$346,609 56	697,043 94	$16,930 86	17,454,672 29	$837,794 85	697,442 30	$16,930 86	13,262,830 44	14,814,998 45	2,639,673 84

BENJ. ALVORD,
Paymaster-General, United States Army.

PAYMASTER-GENERAL'S OFFICE,
Washington, D. C., October 10, 1874.

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Statement of the account of the Pay Department with the several appropriations subject to its control during the fiscal year ending June 30, 1874.

Appropriations.	Balance in the Treasury July 1, 1873.	Amount of appropriations.	Surplus funds deposited by paymasters.	Collections deposited by paymasters.	Amounts covered in by credit-requisitions in settlement of accounts.	Repayments in settlement of accounts.	Total.
DEFINITE.							
Prior to July 1, 1871.							
Pay of the Army	$2,688,725 06		$5,344 69	$15,818 23	$385 17	$1,000 81	$2,711,273 96
Transportation of officers and baggage	95,868 38			1,336 09		116 09	97,320 56
Pay of the Military Academy	130,256 97						130,256 97
Subsistence of officers	2,589,076 16			2,086 25	33 50	142 89	2,591,338 80
Forage of officers' horses	606,788 10			16 53	51 60		606,856 23
Pay in lieu of clothing—officers' servants	34,500 27			110 50			34,610 77
Pay to discharged soldiers—clothing not drawn	211,018 90					136 18	211,155 08
Subsistence of officers—Military Academy	6,813 42						6,813 42
Pay in lieu of clothing—officers' servants at Military Academy	246 54						246 54
Pay of two and three years' volunteers	12,248,958 68			3,015 30	21 09	75,394 87	12,327,389 94
Bounty to volunteers, widows, and legal heirs	1,631,986 04			13 00	80,115 00	21,827 03	1,733,941 07
Pay of militia and volunteers	566,613 64						566,613 64
Pay and bounty, officers and men, Department of the Missouri	188,982 03						188,982 03
Pay, &c., one hundred days' volunteers	500,000 00						500,000 00
Payment of expenses—reconstruction acts	127,184 32			50			127,184 82
Bounty to volunteers and regulars on enlistment	4,569,971 52		425 00		4,653 45	700 00	4,575,749 97
Forage of officers' horses at Military Academy	7,422 78						7,422 78
Incidental expenses Quartermaster's Department	62,089 48						62,089 48
Total	26,266,502 29		5,769 69	22,396 40	85,259 81	99,317 87	26,479,246 06
For fiscal year ending June 30, 1872.							
Pay of the Army	1,496,503 66		72,210 66	13,372 10	31 75	5 26	1,582,123 43
Mileage	22,734 03		8,630 72	202 20			31,566 95
General expenses	150 76		2,732 08	13 16		10 00	2,906 00
Pay of the Military Academy	53,273 75		459 96	86 25			53,819 96
Total	1,572,662 20		84,033 42	13,673 71	31 75	15 26	1,670,416 34

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Statement of the account of the Pay Department with the several appropriations subject to its control, &c.—Continued.

Appropriations.	Balance in the Treasury July 1, 1873.	Amount of appropriations.	Surplus funds deposited by paymasters.	Collections deposited by paymasters.	Amounts covered in by credit-requisitions in settlement of accounts.	Repayments in settlement of accounts.	Total.
DEFINITE—Continued.							
For fiscal year ending June 30, 1873.							
Pay of the Army	$824,965 33		$653,640 87	$344,109 19		$407 88	$1,823,123 27
Mileage	26,416 40		20,531 14	797 45			47,744 99
General expenses	35,754 19		14,309 42	582 02			50,645 63
Pay of the Military Academy	43,953 69		3,282 22	1,271 93			48,507 84
Total	931,089 61		691,763 65	346,760 59		407 88	1,970,021 73
For fiscal year ending June 30, 1874.							
Pay, &c., of the Army		$12,300,000 00	47,547 16	287,871 29		627 85	12,636,046 30
Pay of the Military Academy		220,379 50					220,379 50
Total		12,520,379 50	47,547 16	287,871 29		627 85	12,856,425 80
INDEFINITE.							
Bounty act July 28, 1866		286,249 63		867 25	$35 42	39,076 95	326,229 25
Traveling expenses California and Nevada Volunteers		34,285 56					34,285 56
Traveling expenses First Michigan Cavalry		959 86					959 86
Total		321,495 05		867 25	35 42	39,076 95	361,474 67
Paymasters' collections not deposited							
Grand total	28,770,254 10	12,841,874 55	829,113 92	671,569 24	85,326 98	139,445 81	43,337,584 60

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Statement of the account of the Pay Department with the several appropriations subject to its control, &c.—Continued.

Appropriations.	Amount drawn by requisition of Pay Department.	Amount drawn by requisition of War Department.	Amount drawn by debit-requisitions in settlement of accounts.	Total.	Balance in the Treasury July 1, 1874.	Balance in hands of paymasters June 30, 1874.	Total balance June 30, 1874.
DEFINITE.							
Prior to July 1, 1871.							
Pay of the Army	$44,789 70	$45,216 83	$587 25	$90,593 78	$2,620,680 18	$17,147 81	$2,637,827 99
Transportation of officers and baggage		417 25		417 25	96,903 31		96,903 31
Pay of the Military Academy					130,256 97		130,256 97
Subsistence of officers		88 29	218 21	306 50	2,591,032 30		2,591,032 30
Forage of officers' horses					606,856 23		606,856 23
Pay in lieu of clothing—officers' servants		1 00	8 14	9 14	34,601 63		34,601 63
Pay to discharged soldiers—clothing not drawn		4 64		4 64	211,150 44		211,150 44
Subsistence of officers—Military Academy					6,813 42		6,813 42
Pay in lieu of clothing—officers' servants at Military Academy					246 54		246 54
Pay of two and three years' volunteers	399,000 00	458,617 11	80,193 27	937,810 38	11,389,579 56	179,135 13	11,568,714 69
Bounty to volunteers, widows, and legal heirs	1,199,750 00		43 84	1,199,793 84	534,147 23	590,569 17	1,124,716 40
Pay of militia and volunteers					566,613 64		566,613 64
Pay and bounty, officers and men, Department of the Missouri					188,982 03		188,982 03
Pay, &c., one hundred days' volunteers					500,000 00		500,000 00
Payment of expenses—reconstruction acts		854 37		854 37	126,330 45		126,330 45
Bounty to volunteers and regulars on enlistment			5,078 00	5,078 00	4,570,671 97		4,570,671 97
Forage of officers' horses at Military Academy					7,422 78		7,422 78
Incidental expenses Quartermaster's Department					62,089 48		62,089 48
Total	1,643,539 70	505,199 49	86,128 71	2,234,867 90	24,244,378 16	786,852 11	25,031,230 27
For fiscal year ending June 30, 1872.							
Pay of the Army	26,500 00	56,173 36	357 27	83,030 63	1,499,092 80	31,797 74	1,530,890 54
Mileage					31,566 95	460 17	32,027 12
General expenses					2,906 00	319 62	3,225 62
Pay of the Military Academy					53,819 96		53,819 96
Total	26,500 00	56,173 36	357 27	83,030 63	1,587,385 71	32,577 53	1,619,963 24

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Statement of the account of the Pay Department with the several appropriations subject to its control, &c.—Continued.

Appropriations.	Amount drawn by requisition of Pay Department.	Amount drawn by requisition of War Department.	Amount drawn by debit-requisitions in settlement of accounts.	Total.	Balance in the Treasury July 1, 1874.	Balance in hands of paymasters June 30, 1874.	Total balance June 30, 1874.
DEFINITE—Continued.							
For fiscal year ending June 30, 1873.							
Pay of the Army	$106,700 00	$187,954 44	$128 06	$294,782 50	$1,528,340 77	$39,899 50	$1,568,240 27
Mileage					47,744 99	993 60	48,738 59
General expenses	400 00	2 00		402 00	50,243 63	347 38	50,591 01
Pay of the Military Academy					48,507 84	305 93	48,813 77
Total	107,100 00	187,956 44	128 06	295,184 50	1,674,837 23	41,546 41	1,716,383 64
For fiscal year ending June 30, 1874.							
Pay, &c., of the Army	11,902,711 00	81,922 72		11,984,633 72	651,412 58	1,672,404 36	2,323,816 94
Pay of the Military Academy	201,000 00			201,000 00	19,379 50	28,954 44	48,333 94
Total	12,103,711 00	81,922 72		12,185,633 72	670,792 08	1,701,358 80	2,372,150 88
INDEFINITE.							
Bounty act July 28, 1866	325,000 00	429 25	800 00	326,229 25		71,848 51	71,848 51
Traveling expenses California and Nevada Volunteers	34,285 56			34,285 56		5,355 30	5,355 30
Traveling expenses First Michigan Cavalry	959 86			959 86			
Total	360,245 42	429 25	800 00	361,474 67		77,203 81	77,203 81
Paymasters' collections not deposited						135 18	135 18
Grand total	14,241,096 12	831,681 26	87,414 04	15,160,191 42	28,177,393 18	2,639,673 84	30,817,067 02

BENJAMIN ALVORD, *Paymaster-General United States Army.*

PAYMASTER-GENERAL'S OFFICE, *October* 10, 1874.

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REPORT OF THE CHIEF OF ORDNANCE.

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REPORT

OF

THE CHIEF OF ORDNANCE.

ORDNANCE-OFFICE, WAR DEPARTMENT,
Washington, October 6, 1874.

SIR: I have the honor to submit, for the information of the Secretary of War, the following report of the principal operations of the Ordnance Department during the fiscal year ended June 30, 1874, with such remarks and recommendations as the interests of that branch of the military service seem to require.

The fiscal resources and disbursements of the Department during the year were as follows, viz:

Amount of appropriations in Treasury June 30, 1873*	$2,208,474 43
Amount in Government depositories to credit of disbursing officers on same date	497,471 27
Amount of deposits in Treasury not reported to the credit of the appropriations on same date	450,195 44
Amount of appropriations from July 1, 1873, to June 30, 1874, including the fixed annual appropriation for arming and equipping the militia.	1,952,645 00
Amount of appropriation for "allowance for reduction of wages under the eight-hour law" on accounts audited and allowed during the year, (less refundments)	820 47
Amount (net) received since June 30, 1873, on account of damage to arms in hands of troops, from sales of arms to officers, and of condemned stores, and from all other sources not before mentioned	605,256 49
Total	5,714,863 10

Amount of expenditures since June 30, 1873†	$2,854,592 23
Amount credited to Maj. J. W. Todd under act of Congress approved February 19, 1873	3,000 00
Amount reported as in Treasury June 30, 1873, not carried to the appropriations, now covered in as miscellaneous receipts on account of sales of ordnance-stores	441,937 77
Amount turned over to the Quartermaster-General for repairs of Charleston Arsenal, (now Charleston Barracks)	500 00
Amount deposited in the Treasury during fiscal year ending June 30, 1874, and covered in as miscellaneous receipts	508,150 74
Amount of deposits in Treasury not reported to the credit of the appropriations on June 30, 1874	4,318 38
Amount in Government depositories to the credit of disbursing officers on June 30, 1874	468,258 10
Amount of appropriations in Treasury June 30, 1874	1,434,105 88
Total	5,714,863 10

During the past year the service of the Department and the opera-

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*This amount includes $168,857.50 re-appropriated for year 1874, "Tests of heavy rifled ordnance."

†Including $102,000 paid to Amoskeag Manufacturing Company, adjudged by Court of Claims to be due on account of breach of contract during the war.

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tions of the different arsenals have been as complete and effective as could be expected with the limited appropriations under control, and may be summarized as follows: The erection of public buildings at the Benicia and Rock Island arsenals under specific appropriations; the care and preservation of the different arsenals, and of the ordnance and ordnance-stores thereat; the manufacture of small-arm ammunition and other ordnance-stores and supplies; the preparation of experimental cannon, and the supplying with arms, &c., the Regular Army, the Marine Corps, and the whole body of the militia.

SMALL-ARMS.

The adoption of the Springfield breech-loading system by a board of distinguished officers, convened under congressional enactment, and its subsequent establishment by law as the only system to be used in the manufacture of arms by the Ordnance Department, enable us to continue the manufacture upon a secure basis, and provide an arm, with no superior, that will hardly be superseded by any more perfect invention for many years to come.

The production of rifles and carbines upon the adopted plan has been pushed forward at the National Armory with energy and success, and the new arms issued to the troops will, no doubt, give great satisfaction. Their issue has been greatly retarded by the lack of ammunition, the small appropriation not supplying the number of cartridges per man deemed indispensable by the commanding generals of departments.

The appropriation of $100,000 made by Congress at its last session for the manufacture of arms has had to be supplemented from the permanent appropriation for "arming and equipping the militia," in order to work economically, keep the cost of the arms within proper limits, and enable the Department to supply the wants of the Army and militia. Not less than half a million of dollars should be annually expended at the National Armory, not only as a measure of economy in producing the best arm for the least money, but, in the interest of the country, to make a gradual but sure accumulation of the best weapons as a reserve in case of war. In again urging this important matter upon the attention of Congress, I am actuated solely by a sense of public duty, and an earnest desire to have the nation brought to a keen realization of the necessities of the case and the gravity of the subject, and do not hesitate to express my decided conviction that a liberal, even an extravagant, expenditure at present will prove to be the greatest economy in the future. Every nation that aspires to the dignity of a first-class power has cast aside its obsolete muzzle-loading arms, and at immense cost has been, and is, providing the newest and most approved models by the hundreds of thousands. The sudden eventualities that end in war, and the startling rapidity with which wars are waged and terminated, demand complete preparation in time of peace. With us the want of a large standing army can only be compensated by keeping on hand, ready for any emergency, a complete supply of every description of war-material. Arms and ammunition are of the first importance when an army is to be improvised; and the country should place its dependence at such a juncture mainly on the reserve supplies stored in its arsenals. Certainly not less than half a million of the best arms should be manufactured as rapidly as the monetary condition of the country will permit. Every year's delay is fraught with danger, and the experience of the past is the surest and safest guide in making preparation for the future.

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ARMING AND EQUIPPING THE MILITIA.

An increase in the annual appropriation for arming and equipping the whole body of the militia is again brought to the attention of Congress, with the hope of some legislation thereon. Not only should the appropriation be largely increased to meet the increased wants of our constantly-increasing population, but some legislative action should be taken to relieve many of the States and Territories from charges of arms issued to them during the rebellion, and which should not in fairness have been so charged. This subject has been so often referred to in previous reports, and so largely dwelt upon, that a more extended reference to it at this time is deemed unnecessary.

LEE'S BREECH-LOADING ARM.

Congress at its last session made an appropriation of $10,000 for the purpose of testing Lee's breech-loading arm. A small number are now being made at the National Armory, under the supervision of the inventor, and when completed will be sent into the field for trial.

EXPERIMENTAL CANNON.

Some of the cannon for experimental purposes, authorized by the act of June 6, 1872, are now nearly ready for trial. They include the Sutcliffe breech-loading cannon, four 10-inch Rodman guns converted into 8-inch and 9-inch rifles, and possibly Mann's breech-loading cannon. In the belief that previous to the meeting of Congress much valuable information will be reached from their trial, any further reference to the subject of "armament of fortifications" is deferred for the present, and will be made the burden of a special report hereafter.

GATLING GUNS.

The act of March 3, 1873, appropriated $5,000 "for experiments and tests of two Gatling guns of large caliber for flank defense of fortifications," and upon the recommendation of this Bureau, a board of officers, of which Lieutenant-Colonel Gilmore, Engineers, was president, was convened to make the experiments and tests. Subsequently another board was appointed to determine on the number of Gatling guns required in our fortifications on the 1st of July last. Both reports are herewith submitted, (marked "Appendix F.") This whole subject was brought to the attention of Congress by the Secretary of War, submitting a report from this Office of March 13, 1874, asking for an appropriation of $292,600 to provide the guns recommended by the board. As no action was taken by Congress thereon, the subject is again recommended for favorable consideration.

THE CAVALRY SERVICE.

In October, 1873, attention was called to the necessity of considering what changes should be made in the horse-equipments, accouterments, tools, and materials for cavalry service in the field, and determining on a standard table of supply, &c., and recommending the appointment of a board of cavalry officers to give the Department the benefit of its knowledge and experience. A board of which Colonel Palmer, Second Cavalry, was president, was ordered, and its report is appended, (marked "Appendix G.") The recommendations, when executed, will undoubtedly add greatly to the efficiency of the cavalry service, and this Department will see that every detail is carefully carried out as fast as funds on hand will permit, and with due regard to the utilization of the stock on hand.

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SEA-COAST CARRIAGES.

The attention of the Department has been directed to the further modification and improvement of carriages for sea-coast cannon, with very encouraging results. The report of Maj. S. Crispin, Ordnance Department, is submitted (marked "Appendix H") to show some of the experiments made and interesting data obtained, which bid fair to settle the difficult problem of successfully checking the recoil of heavy masses under powerful strains, within reasonable limits.

ARTESIAN WELL AT THE BENICIA ARSENAL.

For two years past the sinking of an artesian well to supply the wants of the Benicia Arsenal has been prosecuted with persistent energy and with varied success under the small annual appropriations made by Congress. The reports of Lieutenant Colonel McAllister, Ordnance Department, are appended, (marked "Appendix I,") as containing details of daily experiences in the prosecution of the work that may be of interest and value to others engaged in similar enterprises on the Pacific coast and elsewhere. The depth of 656 feet having already been reached, it is hoped that water will be struck during the present year. An additional appropriation is, however, asked for to continue the boring in case of a failure.

ARSENALS.

The annual reports from this Bureau for several years past have directed attention to the large number of arsenals scattered through the country east of the Mississippi River, the consequent lack of concentration of work in the interest of economy and perfection of product, and the undoubted necessity of disposing of several of these national establishments and the building up of a grand arsenal on the Atlantic sea-board. In order to facilitate intelligent action on the subject, by the collection of all necessary data for the information of the Department and of Congress, a recommendation was made by this Bureau some months since for the appointment of a board of ordnance officers to make a comprehensive and exhaustive study of the subject, and also of the question of a proper location for a powder-depot, and of an experimental ground for the testing of heavy ordnance. A board, composed of Majors Crispin, Treadwell, and Baylor, Ordnance Department, was authorized, and, after several months of patient and careful investigation, has made its report, which is herewith transmitted, (marked "Appendix K.") The board strongly recommends the retention of the Springfield Armory and the Frankford Arsenal, and the establishment of a grand arsenal in the vicinity of New York City for manufacturing purposes; retaining also the Indianapolis Arsenal, Indiana; Kennebec Arsenal, Maine; Fort Monroe Arsenal, Virginia; and Augusta Arsenal, Georgia, as places for storage and repair. They recommend the sale of the Allegheny, Columbus, Detroit, Pikesville, Watervliet, Watertown, and Washington Arsenals—the sales to be made as rapidly as circumstances may permit—the proceeds to be devoted to the purchase of a site and the erection of buildings for the grand arsenal. I heartily concur in these recommendations, and invoke favorable consideration on the part of the Secretary of War and of Congress. Some such definite policy must be inaugurated and steadily pursued. That such establishments demand the fostering care of the country calls for no argument, and that the number of our arsenals must be reduced seems to be the conclusion reached by Congress in the past two years, judging from the very small appropriations made for their care and preserva-

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tion, appropriations not sufficient to keep the buildings from running to decay. This seemingly large reduction by sale will, when accomplished, leave thirteen arsenals and the armory, a number amply sufficient, when liberally sustained, to meet all the demands of the nation. And all this can be effected from the sales of arsenals and without the expenditure of a single dollar out of the National Treasury.

The establishment of a powder-depot and an experimental ground for heavy cannon is also discussed by the board, and its recommendations are approved. An estimate for these very important and desirable objects has been made, which it is earnestly requested may be urged upon Congress for favorable action. The great-gun problem cannot be solved without continued experiment, considerable expenditure, and all the facilities of a well-appointed experimental and proving ground. The great improvements in modern gunnery are as much the result of the hourly demonstrations on the experimental ground as in the success of mechanical manipulation and skill in the workshop, and certainly no exercise of theoretical knowledge and research will avail without the crucial tests of experimental proof.

REVISED STATUTES.

Much legislation affecting the Ordnance Department, originating in the earlier days of the republic, and which had in the course of years fallen into disuse, has been revived and incorporated in the Revised Statutes of the United States. Some of it, in matters of detail, is mandatory in its language, and being interwoven with more recent legislation based on the constantly-changing exigencies of service, renders the execution of the letter of the law incompatible with the best interests of the service.

It is not presumed that Congress intended to revive what may be considered obsolete details; but such is the effect of some of the enactments in the Revised Statutes, and I would therefore suggest that, as far as it affects the Ordnance Department, the subject be brought to the attention of Congress.

I have the honor to submit the following papers in addition to those heretofore mentioned:

Appendix A.—Statement of principal articles procured by purchase and fabrication at the arsenals during the year ended June 30, 1874.

Appendix B.—Statement of ordnance, ordnance-stores, &c., issued to the Regular Army and to posts during the year ended June 30, 1874.

Appendix C.—Apportionment of arms for the fiscal year ended June 30, 1874, under the law of 1808, for arming and equipping the militia, as amended by the seventh section of the act approved March 3, 1855, and regulations established in conformity therewith.

Appendix D.—Statement of ordnance, ordnance-stores, &c., distributed to the militia from July 1, 1873, to June 30, 1874, under the law of 1808, as amended by the seventh section of the act approved March 3, 1855.

Appendix E.—Statement of ordnance, ordnance-stores, &c., distributed to colleges from July 1, 1873, to June 30, 1874, under the joint resolution of May 4, 1870.

I have the honor to be, very respectfully, your obedient servant,

S. V. BENÉT,
Brigadier-General, Chief of Ordnance, U. S. A.

The ADJUTANT-GENERAL,
United States Army.

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APPENDIXES.

APPENDIX A.

Statement of principal articles procured by fabrication at the arsenals and by purchase during the year ended June 30, 1874.

57	Gatling guns.
9	15-inch Rodman gun-carriages.
1	15-inch chassis.
99	sights for cannon, assorted.
9	buckets, assorted.
307	handspikes, various.
86	maneuvering-bars.
123	priming-wires.
2	prolonges.
44	rammers and staves, assorted.
3	worms and staves.
147	sponges and rammers.
88	sponges and staves.
32	rammer-heads.
2	sponge-heads.
21	sponges, woolen.
156	implements, various.
47	shell-hooks.
100	securing-stakes.
26	gun-scrapers.
48	stands for sponges.
24	sponge-covers.
2	sets draught-harness.
40	tongs.
108	tow-hooks.
12	tube-pouches.
136	vent-covers.
70	vent-punches.
53	wipers.
1	pack-saddle.
2,584	15-inch shot.
25	10-inch shot.
1,021	300-pounder Parrott shot.
10	8-inch case-shot.
2,724	projectiles, various.
18,510	breech-loading rifle-muskets
10,022	breech-loading rifle-carbines.
8,000	Colt's revolvers.
1	box sample arms.
25	cadet-swords.
31,714	sets equipments, various, for infantry and cavalry.
7,929	sets horse-equipments, for cavalry.
20,861	appendages, various, for small-arms.
26,172	1-inch canister for Gatling guns.
45,741	1-inch cartridges for Gatling guns.
13,767,000	metallic cartridges for small-arms.
27,397	cartridge-bags, filled, various.
21,017	cartridge-bags, unfilled, various.
173,585	friction-primers.
500	signal-shells.
5,000	cartridge-shells.
5,000	lead balls, elongated.
3,910	pounds powder.

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14,450 feet safety-fuse.
60 differential pulleys.
15 hydraulic jacks.
7 derricks.
35 cranes.
5 hoisting-apparatus.
84 blocks, various.
80 chocks.
105 rollers, various.
15 platforms, various.
8 plane-tables.
7 trunnion chains and loops.
50 pneumatic buffers for 15-inch guns.
2 hydraulic buffers.
18 air-cylinders.
671 parts, various, of gun-carriages.
4,600 caps and cylinders.
350 sabots for 15-inch projectiles.
89,407 parts of small-arms.
26,036 parts of equipments.
1,950 fuse-plugs.
74 cavalry forges.
2,720 tools, various.
12,453 arm-chests, packing-boxes, &c.
13,078 yards canvas.
15,700 yards duck.
1,754 yards cloth, assorted.
24,000 pounds rope.
11,300 yards linen.
334,000 pounds sheet-copper.
47,000 horseshoes.
125,000 feet leather, assorted.

APPENDIX B.

Statement of ordnance and ordnance-stores issued to the Regular Army and to posts during the year ending June 30, 1874.

CLASS 1.

4 3-inch wrought-iron field-guns, rifled.
2 4½-inch siege-guns, rifled.
4 12-pounder bronze guns.
4 12-pounder mountain-howitzers.
1 24-pounder field-howitzer.
1 32-pounder field-howitzer.
3 Gatling guns, 1-inch.
2 6-pounder bronze guns.
4 10-pounder Parrott guns.
3 100-pounder Parrott guns, rifled
8 15-inch Rodman guns.
2 24-pounder Coehorn mortars, bronze.
8 13-inch cast-iron mortars.

CLASS 2.

5 6-pounder-gun carriages.
4 10-pounder Parrott-gun carriages.
1 12-pounder-gun carriage, heavy.
7 12-pounder-gun carriages, light, with limbers.
3 12-pounder caissons, with limbers.
5 12-pounder prairie-carriages.
2 12-pounder prairie ammunition-carts.
3 Gatling-gun carriages, with limbers, 1-inch.
3 Gatling-gun caissons, with limbers, 1-inch.
1 limber for Gatling caisson, 1-inch.
57 portable forges.

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5 3-inch field-carriages and limbers.
2 4½-inch siege-carriages and limbers.
3 10-inch barbette-carriages and chassis, wrought iron.
39 15-inch barbette-carriages and chassis, pneumatic buffers
5 15-inch top-carriages, wrought iron.
13 100-pounder Parrott carriages and chassis, wrought iron.
1 200-pounder Parrott carriage and chassis, wrought iron.
1 300-pounder Parrott carriage, upper, wrought iron.
1 300-pounder Parrott carriage and chassis, wrought iron.
3 24-pounder Coehorn mortar-beds, wood.
9 13-inch wrought-iron mortar-beds.
1 13-inch mortar-chassis, experimental.

CLASS 3.

25 sets of harness for two wheel-horses.
32 sets of harness for two lead-horses.

CLASS 4.

100 3-inch Eureka shot.
34 3-inch Absterdam shot.
420 4½-inch Hotchkiss shot.
600 10-inch shot.
1,349 15-inch shot.
16 12-pounder shot.
100 30-pounder Parrott shot.
160 100-pounder Parrott shot.
655 300-pounder Parrott shot.
90 100-pounder Parrott shot, (hollow.)
100 3-inch Eureka shell.
140 4½-inch Absterdam shell.
300 4½-inch Hotchkiss shell.
274 8-inch shell.
50 10-inch mortar-shell.
500 13-inch mortar-shell.
18 12-pounder shell.
125 24-pounder shell.
100 30-pounder Parrott shell.
325 100-pounder Parrott shell.
12 12-pounder case-shot.

CLASS 5.

20 3-inch Hotchkiss shot.
64 12-pounder shot.
275 3-inch Hotchkiss shell.
688 12-pounder shell.
280 3-inch Hotchkiss case-shot.
459 12-pounder case-shot.
449 3-inch Hotchkiss canister.
324 12-pounder canister.
100 24-pounder canister.
500 signal-shells.

CLASS 6.

89 Spencer carbines, caliber .50.
1,995 Sharps' carbines, caliber .50.
4,823 Springfield carbines, caliber .45.
20 smooth-bore muskets, caliber .69.
1,384 Springfield muskets, caliber .50, (model 1868.)
982 Springfield muskets, caliber .50, (model 1870.)
3,959 Springfield rifles, caliber .45.
40 Colt's revolvers, caliber .36.
35 Colt's revolvers, caliber .44.
6,801 Colt's revolvers, caliber .45.
376 Remington revolvers, caliber .44.
93 Remington breech-loading pistols, single-barreled, caliber .50.
26 artillery-sabers.
1,008 cavalry-sabers.
255 non-commissioned officers' swords.
189 musicians' swords.

CLASS 7.

147 artillery saber-belts.

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125 artillery saber-belt plates.
2,984 cavalry saber-belts.
2,987 cavalry saber-belt plates.
1,169 saber-knots.
941 saber-attachments.
2,140 carbine-cartridge boxes.
1,143 carbine-cartridge pouches, (Dyer's.)
3,430 carbine-slings.
2,771 carbine sling-swivels.
2,983 pistol-belt holsters.
1,166 pistol-cartridge pouches.
498 sets of cavalry equipments.
7,733 sets of infantry equipments.
1,591 bayonet-scabbards, leather.
1,773 bayonet-scabbards, steel.
1,232 brace-yokes.
12,147 canteens.
1,750 cartridge-boxes.
1,279 cartridge-boxes, No. 1.
1,201 cartridge-boxes, No. 2.
780 cartridge-box plates.
1,146 cartridge-box belts.
705 cartridge-box belt-plates.
6,827 great-coat straps.
5,435 gun-slings.
10,638 haversacks.
5,002 knapsacks.
1,355 meat-ration cans.
2,846 perforated wooden blocks for cartridge-boxes.
266 sword-belts, non-commissioned officers and musicians'.
265 sword-belt plates, non-commissioned officers and musicians'.
239 sliding-frogs for non-commissioned officers and musicians' waist-belts.
1,238 valises.
2,471 valise-straps.
3,379 waist-belts, privates.
2,275 waist-belt plates, privates.
311 waist-belts, non-commissioned officers and musicians'.
316 waist-belt plates, non-commissioned officers and musicians'.
3,636 bridles, curb.
2,215 bridles, watering.
9,432 curry-combs.
496 carbine-sockets.
2,371 girths.
7,380 halters.
8,703 halter-straps.
11,690 horse-brushes.
7,744 lariats.
1,154 links.
3,468 nose-bags.
2,491 picket-pins.
3,148 saddles.
4,164 saddle-bags.
184 saddle-blankets, artillery.
8,738 saddle-blankets, cavalry.
3,558 side-lines.
7,747 spurs.
7,998 spur-straps.
4,215 surcingles.

CLASS 8.

Cartridges for field-guns.

9,255 blank cartridges, ½-pound charge.
6,080 blank cartridges, 1-pound charge.
7,193 blank cartridges, 1½-pounds charge.
2,658 blank cartridges, 2-pounds charge.
2,880 blank cartridges for 6-pounder gun.
2,800 blank cartridges for 10-pounder gun.
3,098 blank cartridges for 12-pounder gun.
1,250 blank cartridges for 12-pounder howitzer.
100 blank cartridges for 24-pounder gun.

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Metallic ammunition for small-arms.

1,197,500	carbine ball-cartridges, caliber .50.
1,186,400	carbine ball-cartridges, caliber .45.
20,980	Spencer carbine ball-cartridges, caliber .50.
37,400	blank carbine and rifle cartridges, caliber .45.
194,800	blank musket-cartridges, caliber .50.
1,868,160	musket ball-cartridges, caliber .50.
730,000	rifle ball-cartridges, caliber .45.
80,050	blank pistol-cartridges, caliber .44.
94,158	pistol ball-cartridges, caliber .44.
890,350	pistol ball-cartridges, caliber .45.
60,700	blank pistol-cartridges, caliber .45.
42,500	pistol ball-cartridges, caliber .50.
2,000	blank pistol-cartridges, caliber .50.
18,900	ball-cartridges for Gatling gun, caliber 1 inch.
10,000	canister for Gatling gun, caliber 1 inch.
2,000	percussion-caps for pistols.
157,447	friction-primers.
550	fuses, wood.
10,355	fuses, paper.
16,100	pounds of cannon-powder.
450	pounds of mealed-powder.
23,300	pounds of mammoth-powder.
19,458	pounds of mortar-powder.
200	pounds of musket and rifle powder.

Issued to the Marine Corps.

660	Springfield breech-loading muskets, caliber .50; model 1870.

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APPENDIX C.

Apportionment of arms for the fiscal year ending June 30, 1874, under the law of 1808, for arming and equipping the militia, as amended by the seventh section of the act approved March 3, 1855, and regulations established in conformity therewith.

States and Territories.	Number of Representatives and Senators.	Money-value.
Alabama	8	$4,380 29
Arkansas	5	2,737 68
California	5	2,737 68
Connecticut	6	3,285 21
Delaware	3	1,642 61
Florida	3	1,642 61
Georgia	9	4,927 82
Illinois	16	8,760 58
Indiana	13	7,117 97
Iowa	8	4,380 29
Kansas	3	1,642 61
Kentucky	11	6,022 89
Louisiana	7	3,832 75
Maine	7	3,832 75
Maryland	7	3,832 75
Massachusetts	12	6,570 44
Michigan	8	4,380 29
Minnesota	4	2,190 14
Mississippi	7	3,832 75
Missouri	11	6,022 89
Nebraska	3	1,642 61
Nevada	3	1,642 61
New Hampshire	5	2,737 68
New Jersey	7	3,832 75
New York	33	18,068 69
North Carolina	9	4,927 82
Ohio	21	11,498 26
Oregon	3	1,642 61
Pennsylvania	26	14,235 94
Rhode Island	4	2,190 14
South Carolina	6	3,285 21
Tennessee	10	5,475 36
Texas	6	3,285 21
Vermont	5	2,737 68
Virginia	10	5,475 36
West Virginia	5	2,737 68
Wisconsin	8	4,380 29
Arizona Territory*	.....	1,642 61
Colorado Territory*	.....	1,642 61
Dakota Territory*	.....	1,642 61
Idaho Territory*	.....	1,642 61
New Mexico Territory*	.....	1,642 61
Montana Territory*	.....	1,642 61
Utah Territory*	.....	1,642 61
Washington Territory*	.....	1,642 61
Wyoming Territory*	.....	1,642 61
District of Columbia*	.....	1,642 61
Total	317	189,995 00
Freight, &c.	.....	11,005 00
		200,000 00

*Apportionment according to the first paragraph of the President's regulation of April 30, 1855.

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APPENDIX D.

Statement of ordnance, ordnance-stores, &c., distributed to the militia from July 1, 1873. to June 30, 1874, under the law of 1808, as amended by the seventh section of the act approved March 3, 1855.

1 6-pounder bronze gun.
5 12-pounder bronze guns.
4 12-pounder mountain-howitzers.
2 Gatling guns, caliber 1 inch.
12 Gatling guns, caliber .45 inch.
1 6-pounder carriage and limber.
5 12-pounder carriages and limbers.
4 12-pounder prairie-carriages and limbers.
2 1-inch Gatling-gun carriages and limbers.
12 .45-inch Gatling-gun carriages and limbers.
22 sets artillery-harness, for two wheel-horses.
36 sets artillery-harness, for two lead-horses.
2 sets prairie-cart harness for single horse.
2 tarpaulins, 12 by 15 feet.
1 set implements and equipments for 6-pounder gun.
9 sets implements and equipments for 12-pounder guns.
2 sets implements and equipments for 12-pounder mountain-howitzers.
40 solid shot for light 12-pounder gun.
60 case-shot for light 12-pounder gun.
60 shells for light 12-pounder gun.
40 canister-shot for light 12-pounder gun.
150 3-inch Hotchkiss solid shot.
50 3-inch Hotchkiss spherical case-shot.
1,500 Sharps carbines, caliber .50 inch.
50 Spencer carbines, caliber .50 inch.
6,035 Springfield breech-loading rifle-muskets, caliber .50 inch
1 Springfield rifle, caliber .45 inch.
850 Springfield rifle-muskets, caliber .58 inch.
300 Remington pistols, caliber .44 inch.
100 Remington pistols, caliber .50 inch, single barrel.
300 light-cavalry sabers.
20 light-artillery sabers.
200 non-commissioned officers' swords.
20 light-artillery saber belts and plates.
300 sets cavalry-accouterments.
1,050 carbine-cartridge boxes.
1,050 carbine-slings.
1,050 carbine-sling swivels.
100 pistol-belt holsters.
50 saber belts and plates.
40 saber-knots.
1 set infantry-equipments.
5,347 sets infantry-accouterments.
200 bayonet-scabbards.
200 cartridge-boxes.
1,300 cartridge-box belts and plates.
100 sliding-frogs.
1,510 gun-slings.
100 non-commissioned officers' shoulder belts and plates.
150 non-commissioned officers' waist belts and plates.
1,000 waist belts and plates, privates.
25 compound screw-drivers.
300 tompions.
450 cavalry curb-bridles.
490 watering-bridles.
90 curry-combs.
5 carbine sockets and straps.
4 cruppers.
6 girths.
490 halters.
70 nose-bags.
1 picket-rope.
462 cavalry-saddles.

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50 pairs saddle-bags.
40 artillery saddle-blankets.
75 pairs spurs and straps.
490 surcingles.
300 3-inch cartridge-bags, filled.
100 12-pounder cartridge-bags, filled.
450 carbine ball-cartridges, caliber .52 inch.
101,000 carbine ball-cartridges, caliber .50 inch.
6,000 carbine blank cartridges, caliber .50 inch.
80,000 musket ball-cartridges, caliber .58 inch.
5,050 musket blank cartridges, caliber .58 inch.
210,600 musket ball-cartridges, caliber .50 inch.
35,000 musket blank cartridges, caliber .50 inch.
5,000 rifle ball cartridges, caliber .45 inch.
2,000 canister for 1-inch Gatling gun.
3,000 ball-cartridges for 1-inch Gatling gun.
12,000 pistol ball-cartridges, caliber .44 inch.
5,000 pistol ball-cartridges, caliber .50 inch.
2,000 pounds cannon-powder.
1,000 pounds mortar-powder.
15,900 friction-primers.
25,000 musket percussion-caps.
2 artillery-collars.
16 artillery-whips.
300 spare parts for Springfield musket, caliber .58 inch.
1,000 spare parts for Springfield musket, caliber .50 inch.
6 arm-chests.
4 packing-boxes.

APPENDIX E.

Statement of ordnance, ordnance-stores, &c., distributed to the colleges from July 1, 1873 *to June* 30, 1874, *under the joint resolution of May* 4, 1870.

2 6-pounder bronze guns.
2 12-pounder bronze guns.
2 6-pounder carriages and limbers.
2 12-pounder carriages and limbers.
2 6-pounder caissons and limbers.
2 12-pounder caissons and limbers.
2 sets implements and equipments for 6-pounder gun.
2 sets implements and equipments for 12-pounder gun.
4 tarpaulins, 12 by 15 feet.
300 breech-loading cadet-muskets, caliber .50 inch.
20 non-commissioned officers' swords.
300 sets cadet accouterments.
20 non-commissioned officers' shoulder belts and plates.

APPENDIX F.

Report of the board of officers appointed by Special Orders No. 108, *Adjutant-General's Office, May* 31, 1873, *on Gatling guns of large caliber for flank-defense.*

ORDNANCE-OFFICE, WAR DEPARTMENT,
Washington, May 24, 1873.

SIR: The "act making appropriations for the support of the Army for the year ending June 30, 1874," appropriates "For experiments and tests of two Gatling guns of large caliber for flank-defense of fortifications, five thousand dollars."

As this subject is one of great importance, and its determination one requiring great care and extended experiment, it is respectfully recommended that a board of one engineer, one ordnance and one artillery officer be appointed to carry out the provisions of the law, and make their report to the Chief of Ordnance.

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The board to meet at Hartford, Conn., on the 5th June, to decide upon the caliber of guns to be tried, and the ammunition to be used, and fix upon a programme for the trial, with authority to adjourn and meet again at the call of the president of the board, at such place as may be decided on for the tests and experiments.

Respectfully, your obedient servant,

By order of the Chief of Ordnance.

S. V. BENÉT,
Major of Ordnance.

The Hon. SECRETARY OF WAR.

NEW YORK, *January* 16, 1874.

GENERAL: I have the honor to transmit herewith the report of the board appointed by Special Orders No. 108, War Department, Adjutant-General's Office, Washington, D. C., May 31, 1873, "to decide upon the caliber of guns to be tried, and the ammunition to be used, in the experiments and tests of two Gatling guns of large caliber for flank-defense of fortifications," &c.

The minutes of the proceedings of the board form a part of the report.

The board desire to express their sense of the obligations they are under to Col. W. F. Barry, commanding the artillery school, and to Maj. T. G. Baylor, commanding the arsenal at Fortress Monroe, for facilities afforded and courtesies extended to the board during the trials.

Very respectfully, your obedient servant,

Q. A. GILLMORE,
Major of Engineers, Bvt. Maj. Gen., President of Board.

The CHIEF OF ORDNANCE, U. S. A.,
Washington, D. C.

REPORT.

Minutes of the proceedings of a board convened at Hartford, Conn., by virtue of the following order.

[Special Orders No. 108.—Extract.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, D. C., May 31, 1873.

* * * * * * *

2. A board to consist of Maj. Q. A. Gillmore, Corps of Engineers; Maj. T. J. Treadwell, Ordnance Department; Capt. Lorenzo Lorain, Third Artillery, is appointed to meet at Hartford, Conn., on the 5th day of June, 1873, or as soon thereafter as practicable, to decide upon the caliber of guns to be tried, and the ammunition to be used, in the experiments and tests of two Gatling guns of large caliber for flank-defense of fortifications, authorized by act of Congress approved March 3, 1873, published in General Orders No. 44, March 22, 1873, from this Office.

The board will fix upon a programme for the trial, and is authorized to adjourn and meet again, at the call of the president of the board, at such place as may be decided on for the tests and experiments.

The board will make their reports to the Chief of Ordnance.

The junior member of the board will act as recorder.

* * * * * * *

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

Official:
J. P. MARTIN,
Assistant Adjutant-General.

HARTFORD, CONN., *June* 5, 1873.

The board met pursuant to the foregoing order, all the members being present.

A letter from the Chief of Ordnance and a copy of General Orders No. 44, War Department, Adjutant-General's Office, March 22, 1873, promulgating the act of Congress under which the board was organized, were presented and read by the recorder.

The board then proceeded to the examination of two 1-inch Gatling guns and corresponding ammunition presented by the Gatling Gun Company, and then adjourned to meet in New York City at 10 o'clock a. m. on the 6th.

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NEW YORK, *June* 6, 1873.

The board met pursuant to adjournment, all the members being present, and concluded that, before submitting any programme for the experiments and tests, it is desirable to obtain all the official reports and information possible, in reference to the Gatling gun, on file in the Ordnance Department.

The president of the board was requested to obtain the desired information.

The board adjourned to meet at the call of the president.

NEW YORK, *June* 20, 1873.

The board met pursuant to the call of the president, all the members being present.

The president of the board laid before it for consideration a number of official reports of experiments with the Gatling gun and of competitive trials between the Gatling and other guns, received from the Chief of Ordnance.

[For a list of these reports see "Synopsis of the previous reports and competitive trials with the Gatling gun," page 19.]

The board adjourned to meet at West Point, N. Y., on the 21st instant, for the purpose of ascertaining if a suitable practice-ground could be had at that place.

WEST POINT, N. Y., *June* 21, 1873.

The board met pursuant to adjournment, all the members being present, and, after a careful examination, concluded that there was no suitable ground for conducting the contemplated tests and experiments in that vicinity.

The board adjourned to meet in New York on the 23d instant.

NEW YORK, *June* 23, 1873.

The board met pursuant to adjournment, all the members being present, and agreed upon the partial programme set forth in the following letter to the Chief of Ordnance:

ARMY BUILDING, NEW YORK, *June* 23, 1873.

GENERAL:

* * * * * * *

From the information and reports supplied from the Office of the Chief of Ordnance, it is thought that two Gatling guns, differing very considerably in caliber, the larger firing canister at comparatively short ranges, and the smaller firing solid shot at longer ranges, should be first placed in competition with the 8-inch siege-howitzer and the 12-pounder Napoleon gun.

The Gatling guns recommended for trial are the 1-inch and the 0.42-inch calibers.

AMMUNITION.

The board recommends that ammunition be prepared as follows:

For the 1-inch Gatling gun:

1,000 rounds of canister, made with 18, or, better, if possible, with 21 balls of same size, as now used, reducing end of cartridge to facilitate feeding, omitting large ball, and closing end with pasteboard wad.

1,000 rounds of canister, made as above, substituting for the balls lead cylinders of the same diameter and length as the balls. The standard length of cartridge will fix the number of tiers of cylinders.

2,000 rounds of canister, as now made.

1,000 rounds of solid shot, as now made.

For the 0.42-inch Gatling gun:

5,000 rounds hardened projectiles.

For the 8-inch siege-howitzer:

50 rounds service-canister.

50 rounds special canister, of the same length and weight as service-projectile, but filled with lead balls, five to the pound.

For the 12-pounder Napoleon gun:

50 rounds of service-canister.

50 rounds of special canister, of same length and weight as service-projectile, but filled with lead balls, eleven to the pound.

50 rounds of spherical case.

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TARGETS.

One frame and canvas target 9 feet by 45 feet, suitably divided into squares by horizontal and vertical lines, with extra canvas for renewing the cover.

One penetration target.

The board submit this as a partial programme only, to be supplemented by such additional trials as may suggest themselves during the first series of experiments, and recommend that the guns, ammunition, and other materials specified above, be sent to the commanding officer of the arsenal at Fortress Monroe, with instructions to extend the board such necessary assistance as they may require in conducting the trials.

Very respectfully, your obedient servant,

Q. A. GILLMORE,
Major of Engineers, Brevet Major-General, President of the Board.

To the CHIEF OF ORDNANCE, *United States Army,*
Washington, D. C.

The board adjourned to meet at Fortress Monroe at the call of the president.

FORTRESS MONROE, VA.,
September 30, 1873.

The board met pursuant to the call of the president, all the members being present.

The president of the board laid before it a letter from the Chief of Ordnance, approving the programme as recommended by the board.

The board then proceeded to the trials set forth in their programme; for the general results of which see the body of the report and accompanying targets. The board being dissatisfied with the performance of the time-fuses, recommended additional trials as set forth in the following letter to the Chief of Ordnance:

NEW YORK, *October* 6, 1873.

GENERAL: I have the honor to report that the board for testing the Gatling guns met at Fortress Monroe, Va., on Tuesday, the 30th ultimo, prosecuted their labors until Saturday evening, the fourth instant, and then adjourned without bringing their trials to a close.

The competitive trials with 8-inch canister, within suitable range for that kind of projectile, were satisfactory and conclusive; but at longer ranges the results were uniformly bad, with case-shot, from both the 8-inch howitzer and 12-pounder Napoleon gun, owing to bad fuses.

The board are unanimously of the opinion that the trials should embrace ranges of 800 to 1,000, and even 1,200 yards, for the reasons that, although ranges of 150 to 200 yards will suffice for the flanks of most of our permanent works, longer ranges are necessary for field-works, especially detached works in which the guns in the flanks command the approaches for considerable distances.

After full conference with Colonel Baylor, the board recommend that he be authorized to prepare 30 rounds of case-shot for the 8-inch howitzer and 30 rounds of case-shot for the 4½-inch rifle, with concussion or other fuses, as in his judgment he shall deem best. Colonel Baylor thought he could get this ammunition ready by the last week of the present month.

Very respectfully, your obedient servant,

Q. A. GILLMORE,
Major of Engineers, Brevet Major-General,
United States Army, President of Board.

Brig.-Gen. A. B. DYER,
Chief of Ordnance, United States Army,
Washington, D. C.

Colonel Baylor was also requested to construct ten targets of one-inch yellow-pine boards, each 6 feet high and 50 feet long, to represent a column of infantry, by companies at full distance, approaching or retiring from the battery, the nearest company being 1,000 yards from the gun. The targets to be placed behind each other in succession 50 feet apart.

The board adjourned to meet at Fortress Monroe at the call of the president.

FORTRESS MONROE, *November* 11, 1873.

The board met pursuant to the call of the president, all the members being present, and proceeded to continue the trials in accordance with the approved programme; the results of which are given in the body of the report and the accompanying targets.

The board adjourned to meet at the call of the president.

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NEW YORK, *December* 20, 1873.

The board met pursuant to the call of the president, all the members being present, and proceeded to a discussion of the results of the trials, and the preparation of their report. Having agreed upon the recommendations to be made, the form of report, and the character of the drawings and diagrams of targets to accompany the same, the board adjourned to meet again at the call of the president, should another meeting be deemed necessary, otherwise the report to be sent by the president to the other members for their signatures.

No subsequent meeting was held.

The Gatling gun, shown on its carriage in Fig. 1, may be described as consisting of a number of very simple breech-loading rifled barrels grouped around and revolving about a common axis, with which they lie parallel. These component barrels are loaded and fired while revolving, the empty cartridge-shells being ejected in continuous succession. Each barrel is fired only once in a revolution, but as many successive shots are delivered during that time as there are different barrels, so that the ten-barrel Gatling gun fires ten times in one revolution of the group of barrels. The action of each part is therefore quite deliberate, while collectively the discharges are frequent.

The working of the gun is simple. One man places one end of a feed-case full of cartridges into a hopper at the top of the gun, while another man turns a crank by which the gun is revolved. As soon as the supply of cartridges in one feed-case is exhausted, another case may be substituted without interrupting the revolution or the succession of discharges. The usual number of barrels composing the gun is ten. The mechanism by which the described results are effected is simple, and can be readily understood from the following description and the accompanying plates.

The ten barrels are grouped around a central shaft, and parallel thereto. The bore of each barrel extends through from end to end, and the breech is chambered to receive a flanged "center-fire" metallic-case cartridge. The breech ends of all the barrels are firmly screwed into a disk or rear barrel-plate, which is fastened to the shaft, while the muzzles pass through another similar disk, called *front barrel-plate*, on the same shaft. The shaft is considerably longer than the barrels, and projects beyond the muzzles, while it extends backward for some distance behind the breeches of the barrels. Directly behind the open barrels a hollow cylinder of metal, called a *carrier-block*, is fastened to the shaft, and in the exterior surface of this carrier-block ten semi-cylindrical channels are cut, which form trough-like extensions of the cartridge-chambers of the barrels to the rear, and are designed to receive and guide the cartridges while they are being thrust into the barrels, and to guide the empty cases while they are being withdrawn. Behind the *carrier-block* the shaft carries another cylinder, called the *lock-cylinder*, in whose surface ten guide-grooves are formed, which are in line with the barrels, and in which slide ten long breech-plugs or locks, called *lock-tubes* or *plungers*, by which the cartridges are thrust into the barrels, and which close the barrels and resist the reaction of the charges when they are fired. This cylinder is called the *lock-cylinder* because each plug or lock contains a spiral main-spring acting on a firing-pin or hammer, by which the charge is fired, so that the plug performs all the functions of a gun-lock, as well as of a breech-plug. The shaft to which the group of barrels and both the carrier-block and the lock-cylinder are rigidly attached is free to turn on its axis, the front end being journaled in the front part of the frame and the rear end in a diaphragm in the *breech-casing*. The breech-casing extends to the rear far enough to contain not only the *diaphragm* through which the main shaft is journaled, but also to form in the rear of the diaphragm a cover for the gearing by which the shaft is revolved. This mechanism or gearing consists simply of a toothed wheel fastened to the shaft and worked by an endless screw on a small axle which passes transversely through the case at right angles to the shaft, and is furnished outside the case with a hand-crank. A cascabel-plate closes the end of the case. Each breech-plug or lock carries a hooked *extractor*, which snaps over and engages the cartridge-flange when the plug is pushed forward, but which, when the plug retreats, withdraws and ejects the empty case. The *cartridge carrier-block* is covered above the frame by a semi-cylindrical shell, which is provided at the top with an opening of suitable size and shape to permit a single cartridge to fall through it into one of the channels of the carrier-block, which it overlies. There is a suitable trough extending upward from this opening and forming a *hopper*, in which a straight feed-case can be placed in a vertical position, containing a number of cartridges lying lengthwise across the case, one above another. Beneath the *carrier-block* everything is open, so that the cartridges or shells which are withdrawn by the extracting-hooks from the barrels fall to the ground. Within the cylindrical breech-case attached to the frame a heavy ring not quite the length of the lock-cylinder is fastened to the case and diaphragm, which nearly fills the space between the inside of the case and the cylinder. Portions of the inside of this ring are so cut away as to leave a truncated, wedge-shaped, annular or spiral *cam* projecting from the inner surface of the ring, having two helicoidal edges inclined to each other and united by a short, flat plane. Against these edges the rear ends of the locks or breech-plugs continually bear, there being room enough for the locks to lie loosely within the parts of the ring which are cut away. The apex of the

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wedge-shape cam points to the barrels. Each lock is held back against the cam by a lug or horn projecting laterally from the end of the lock and entering a groove formed at the base of the cam, in the thin part of the ring.

The shape and position of the cam and grooves may be better understood by reference to the diagram, Fig. 2, which shows the cam-ring as it would appear if cut open and spread out flat, the lines A and C being the development of the edges of the helicoidal cam surfaces, B that of the plane surface connecting these, and *a* and *c* the grooves for holding and drawing back the locks. The ten locks are shown in their relative positions abutting against the cam surfaces, six of them being shown in section.

It will be seen that the points of the firing-pins or lock-hammers, H, protrude beyond the front of the locks, while the spindles project from the rear, where they are fashioned into knobs by which the hammers are drawn backward and cocked while passing through the groove in the *rib*, D.

The diagram shows that the distance of the apex, B, of the cam from the ends of the barrels is such that the breech-plugs or locks exactly fill the space, so that each plug there forms an abutment which closes the breech of its barrel and abuts against the apex of the cam, which serves to resist the recoil of the plug when the charge is fired. It will be remembered that the locks are guided in grooves formed in the *lock-cylinder*, and therefore cannot deviate from their alignment with the barrels. The *lock-cylinder* and the cartridge *carrier-block* could not be shown in the diagram, because if they were spread out as the locks are they would cover them and hide them from view. From what has before been explained it will be understood that the ten barrels, the cartridge carrier-block, and the lock-cylinder carrying its ten locks, all shown together in Fig. 3, will, by turning the crank, revolve together about the axis of the central shaft, the lock-cylinder revolving within the stationary case and cam-ring, and the cartridge carrier-block revolving beneath the half-cylindrical shell which carries the hopper. Fig. 4 shows the frame which encases the gun, with the trunnions, breech-casing, and hopper for feeding the cartridges. The cartridges will, as the carrier-block channels come successively under the hopper, drop into the channels in front of the locks and be kept in place by the hopper-shell. The revolution of the lock-cylinder carries the locks around with it, and causes them to receive a longitudinal reciprocal motion by their ends sliding along the inclined surfaces of the stationary cam. Each lock, then, one after the other, is pushed forward toward its barrel. As the revolution of the parts keeps the locks in contact with the advancing side of the cam, each lock in succession closes its barrel, and its longitudinal motion ceases, while it passes the flat surface of the cam, and then each slides backward from its barrel when constrained to move along the retreating side of the cam by the corresponding cam-groove, and so on, each lock repeating these movements at each successive revolution of the shaft.

The position of the cam relatively to the cartridge-hopper is such that each lock is drawn backward to its full extent when it passes the hopper, so that the cartridges may fall into the carrier in front of the locks. The explosion of each cartridge takes place as its proper lock passes over the flat apex of the cam which resists the recoil.

The hammer is cocked by the knob or head at its rear end coming into contact with a flat *rib* located inside of the cam, as shown on the diagram at D. This rib restrains the hammer from moving forward, while the forward movement of the body of the lock continues; the spiral mainspring is compressed until the revolution carries the hammer-knob beyond the end of the cocking-rib, when the hammer will spring forward and strike with its point the center of the cartridge-head and explode the charge. The point in the revolution at which the barrels are discharged is below and at one side of the axis. The diagram shows the ten locks each in a different part of its cycle of action. At I the cartridge has just dropped in front of the lock, at II it has been pushed forward somewhat, at III the point of the cartridge has entered the barrel, at IV it is pushed nearly home, and the head of the hammer is retained by the cocking-rib, II, the mainspring being partly compressed. At V the lock has reached the flat part of the cam, the cartridge is pushed quite home, and the mainspring has been fully compressed by the retention of the hammer by the cocking-rib, the end of which is just reached by the hammer, which is about being released. At VI the hammer having been released has sprung forward and exploded the cartridge, the end of the lock or breech-plug being firmly braced against the flat surface, B, of the cam. At VII the lock has commenced to retreat, and at VIII it has partially withdrawn the empty cartridge-shell from the barrel. At IX it has completely extracted the shell, which is falling away from the gun. At X the lock is fully drawn back and is about to pass again into its first position. Thus it will be seen that in the ten-barrel gun one revolution of the barrels corresponds to one revolution of the locks, and delivers ten shots, a process which is repeated continuously so long as the crank is turned and the cartridges supplied. The gun can be unloaded of any cartridges not fired by removing the feed-case, opening the hopper, and reversing the motion of the crank. The locks are made interchangeable and are strong and durable, but should they get out of order the gun is so constructed that any one or all of them can be, in a few moments, taken out and others inserted in their places, and so

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the gun can be kept in perfect working order at all times on the field of battle. In the new model the mechanism of the locks has been greatly strengthened, as well as otherwise improved, and there are means provided for their insertion and removal without taking off the cascabel-plate. These means consist of the perforation of the covering and back diaphragm in the outer casing, and by the closure of the apertures through both these plates by a single removable plug, as shown above the knob of the cascabel in Fig. I.

This is a very valuable improvement, inasmuch as the repairing or inspection of the locks is thereby greatly facilitated. The absence of one or more locks does not affect the working of the gun except to diminish the intensity of fire in proportion to the number of locks removed. For each lock removed, however, one unexploded cartridge falls to the ground at each revolution of the gun. The gun is encased in a frame which has trunnions, and is mounted in the ordinary way, like a field-piece. The screw for elevating and depressing the breech works in a nut attached to the trail of the carriage in the usual way. An automatic traversing apparatus is applied, by which a limited angular movement in a horizontal plane may be given to the gun, as follows: A cylinder having a cam-groove in its periphery is applied to the crank-axle, and the end of a cylindrical pin enters this groove. The cylindrical pin is attached to an arm which is connected to the elevating-screw; when the crank is turned the cam-groove travels back and forth on the cylindrical pin, swinging the gun from side to side through a sector of three degrees. The pin may be thrown out of gear with the cylinder and the gun be fired without swinging. The sector, covered automatically by the oscillator, may be changed about five degrees on each side without moving the trail or suspending the firing. The cases which contain the cartridges, and which are applied to the hopper when it is desired to feed the gun, are long narrow boxes of sheet-tin open only at the lower ends. The cross-section of the case is trapezoidal, the edge next to which the heads lie being much wider than the cartridge-heads, while that which receives the points of the balls is of the width of the ball. This form enables all the cartridges in the case to assume a horizontal position, because the heads of the contiguous cartridges have room to roll over slightly, so as to lie partly alongside of each other, while the ball-ends are kept vertically over each other. For drawing of feed-case see Fig. 5. The supply of cartridges to the gun may also be made by what is called the "*feed-drum*." The straight feed-cases each contain forty cartridges. The feed-drum (used only with the smaller calibers) contains sixteen radial sections grouped vertically about the axis of the drum, each section holding twenty cartridges, or three hundred and twenty cartridges to each drum. The number of sections in the drum and the number of cartridges in each section may be varied. The drum rests vertically over the hopper and feeds the cartridges automatically, from the several sections in succession. The principal objection to the drum consists in the greater number of cartridges which it exposes to an enemy's fire and the inferior facilities which it affords for packing and transporting the ammunition. The straight feed-cases are deemed to possess superior advantages, and are recommended for all calibers.

Weights of the Gatling 10-*barrel guns.*

	Pounds.
1-inch caliber	650
0.75-inch and 0.65-inch caliber	450
0.55-inch caliber	400
0.50-inch, 0.45-inch, and 0.42-inch caliber, with long barrel	200
Same calibers with short barrels	135

Weights of carriages for Gatling 10-*barrel guns.*

	Pounds.
Carriage for 1-inch gun:	
Weight of limber and box	790
Weight of gun-carriage	1,152
Total	1,942

	Pounds.
Carriage for 0.42-inch, 0.45-inch, and 0.50-inch guns:	
Limber complete	387
Gun-carriage complete	326
Total	713

Weight of empty feed-drum for 0.42-inch-caliber gun, 25 pounds; weight of same filled with 400 cartridges, 60 pounds; weight of empty feed-case for 0.42-inch-caliber gun, 2 pounds 6 ounces; weight of same filled with 40 cartridges, 5 pounds 15 ounces.

The limber for the 0.42-inch gun will hold 50 cases, or 2,000 cartridges. Aggregate weight of 0.42-inch-caliber gun, gun-carriage, limber, and 2,000 cartridges in feed-cases, 1,210 pounds. Weight of 5,000 extra 0.42-inch cartridges (1,000 in a box) and 5 packing-boxes, 496 pounds.

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12-pounder Napoleon, bronze, iber 4.62.)

	Pounds
Weight of gun and limber, with implements	3,895
Weight of ammunition in limber-box when full, (32 rounds)	497
Weight of tarpaulin	36
Weight of gun and limber, with ammunition packed	4,428

8-inch siege-howitzer.

	Pounds.
Weight of gun-carriage and limber	3,919
Weight of gun	2,614
Total	6,533

There is no limber-box.

4½-inch rifle.

	Pounds.
Weight of gun-carriage and limber	3,641
Weight of gun	3,450
Total	7,091

There is no limber-box.

AMMUNITION FOR GATLING GUNS.

The Gatling guns are designed to be served with ordinary center-fire metallic-case cartridges, in order that the ammunition shall be interchangeable with that for small arms of the same caliber.

For the 1-inch-caliber gun, in addition to the cartridge containing a single solid projectile, a canister-cartridge has been used, containing 15 lead balls, each weighing 141 grains, terminating in front with a one-inch half-round projectile, weighing 1,287 grains.

The total weight of this 1-inch canister-cartridge is 5,190 grains.

The 1-inch solid-ball cartridge is made up as follows:

	Grains.
Projectile	3,942
Metallic case	1,382
Powder	500
Lubricant	51
Total	5,875

No description of the ammunition for the several calibers is deemed necessary, except that used during the trials.

AMMUNITION USED BY THE BOARD.

With the 0.42-inch Gatling gun.

One trial was made with cartridges containing two balls. In all the other trials but one ball was used, the ammunition being known as the "Berdan center-fire metallic-case cartridge;" the weight of the component parts being as follows:

	Grains.
0.42-inch-caliber projectile	370
Metallic case and lubricant	163
Powder, (Hazard's Gatling powder No. 1)	77
Total weight of 0.42-inch-caliber cartridge, (see Fig. 6)	610

With the 1.00-inch-caliber Gatling gun.

Two kinds of special canister ammunition, devised by the board, were used; one containing 21 round lead balls, and the other 18 cylindrical slugs. The weights of the component parts for each are given below:

Spherical canister for 1.00-inch Gatling gun.

	Grains.
31 lead balls, each 0.45 inch diameter, and weighing 141 grains	2,961
Metallic case	1,413
Powder	375
Wads and lubricant, about	170
Total weight of canister-cartridge with spherical ball, (see Fig. 7)	4,919

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Cylindrical-slug canister for 1.00-inch Gatling gun.

	Grains.
18 cylindrical slugs, each 0.45 inch diameter, and 0.45 inch long, and weighing 199 grains	3,582
Metallic case	1,496
Powder	375
Wads and lubricant, about	90
Total weight of canister-cartridge with cylindrical slugs, (see Fig. 8)	5,543

A few trials were made with a 1-inch-caliber percusssion shell, (see Fig. 9.)

With the 8-inch siege-howitzer.

Ordinary service-canister, containing 48 iron balls, each 1.85 inches diameter, and weighing 0.86 pound : total weight of canister, 53½ pounds.

Spherical case No. 1, containing 486 lead balls, each 0.69 inch diameter, and weighing 14 to the pound; total weight of one case-shot, fixed, 59½ pounds.

Spherical case No. 2, containing 470 lead balls, 14 to the pound; weight, fixed, 60 pounds 3 ounces.

Special canister No. 1, devised by the board, containing 208 lead balls 0.977 inch diameter, (5 to the pound;) total weight of canister, 54 pounds.

Special canister No. 2, devised by the board, containing 440 lead balls 0.75 inch diameter, (11 to the pound;) total weight of canister, 54 pounds.

With the 12-pounder Napoleon gun.

Special canister, devised by the board, containing 121 lead balls 0.75 inch diameter, (11 to the pound;) total weight of canister, 14½ pounds.

Spherical case, containing 82 lead balls, each 0.69 inch diameter, and weighing 14 to the pound; total weight of one case-shot, fixed, 14.7 pounds.

With the 4½-inch-caliber rifle.

Service shrapnel, (with Schenkl percussion-fuse,) containing 168 lead balls 0.69-inch diameter weighing 14 to the pound; total weight of case-shot, 32 pounds.

The Bormann fuse was used during the first trials, with the spherical case, from both the 8-inch howitzer and the 12-pounder Napoleon gun.

During the last experiments the ordinary paper-fuse was used.

SYNOPSIS OF PREVIOUS REPORTS AND COMPETITIVE TRIALS WITH THE GATLING GUN.

"Report on Gatling's improved battery-gun," made by Lieut. I. W. Maclay, First Artillery, Washington Arsenal, January 20, 1865, giving a description of the 4-barreled 0.58-inch gun.

[The trials for accuracy at 100, 300, and 500 yards, also for rapidity of firing and penetration. Target was 10 feet by 10 feet.]

Range in yards.	Number of shots fired.	Number of hits.	Remarks.
100	20	20	Twenty shots fired in eight seconds.
300	20	20	Penetration at 300 yards through eleven inches of pine, (probably white pine.)
500	20	18	

"In the event of one barrel or lock becoming disabled the gun is still efficient, as was proved by continuing the trials after one barrel had burst. All the parts of the gun worked well."

"The gun certainly possesses the advantages of rapidity and accuracy." There is no escape of gas, but, like all fire-arms, there is a recoil."

General suggestions in regard to the twist and depth of the grooves, also as to the weight of the carriage. (Second report by the same officer, March 9, 1865, containing a partial description of the 6-barreled Gatling gun.)

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"Report on the Gatling repeating-gun," made by Bvt. Lieut. Col. D. H. Buel, United States Ordnance, Frankford Arsenal, March 16, 1866, containing a record of the firing of the 1-inch Gatling gun, smooth-bore, with canister.

Range in yards.	Number of rounds.	Number of projectiles.	Number of hits.	Remarks.
100	12	192	180	Target 35½ feet by 15 feet, made of inch pine boards.
150	12	192	123	
200	12	192	64	About 25 per cent. failed to penetrate the target.
250	12	192	34	About 50 per cent. failed to penetrate the target.

"The gun worked smoothly in all its parts; the cartridges were fed and the cases thrown out with ease and certainty." "Out of 342 cartridges there were but 4 failures."

"Report of the competitive trials of the Gatling 1-inch-caliber rifled gun and the 24-pounder flank-defense howitzer," made by Bvt. Lieut. Col. T. G. Baylor, United States Ordnance, at Fortress Monroe Arsenal, July 14, 1866.

"I consider it a superior arm to the 24-pounder howitzer for flank-defense, as from 80 to 100 buck-and-ball cartridges can be fired in 1 minute and 30 seconds, being a discharge of 1,200 to 1,600 projectiles, while from the 24-pounder only 4 rounds, giving for canister 192 and for case-shot 700 projectiles in the same time."

"The machinery of this gun is simple and strong; I do not think it likely to get out of order." "The size of the bore might be increased to advantage."

Range in yards.	Number of rounds fir'd.	Number of projectiles.	Number of hits.	Remarks.
800	110	110	49	Firing solid shot. Target 24 feet by 6 feet.
1,000	92	92	50	Firing solid shot. Target 12 feet by 12 feet.
1,200	87	87	22	Firing solid shot. Target 12 feet by 12 feet.
200	73	1,168	278	Firing canister. Target 48 feet by 6 feet.
200	74	1,184	322	Firing canister. Target 48 feet by 6 feet.
150	101	1,616	691	Firing canister. Target 48 feet by 6 feet.
100	29	464	291	Firing canister. Target 48 feet by 6 feet.

"Report of the trials with the center-fire cartridge in the Gatling gun," made by Bvt. Lieut. Col. S. V. Benét, United States Ordnance, at Frankford Arsenal, November 10, 1866.—"The firing was an entire success; the working of the gun was perfect." "I consider that the center-fire arrangement and the use of the center-fire cartridges add 100 per cent. to the value and efficiency of the gun."

"Report on certain defects in the Gatling gun," made by Lieut. J. G. Butler, United States Ordnance, at Leavenworth Arsenal, October 2, 1867, calling attention to the fact that the "barrels were successively discharged before they had fairly cleared the front transverse bar of the gun-frame, and that it was not the undermost barrel that fired," and suggests certain changes so as to cause the firing to take place when the barrel is at a lower position.

"Report on the Gatling gun," made by Lieut. C. E. Dutton, United States Ordnance, at Watervliet Arsenal, October 12, 1867, giving the results of the trials for the purpose of "ascertaining at what precise point in the revolution of the barrels the fire is delivered when turned very slowly, and how much alteration takes place in the relative position of that point when turned rapidly," stating that in slow firing the ball from the inch-gun clears the bar by 3-16 of an inch, and that of the ½-inch gun by 1-6 inch; a more rapid motion causes the firing to take place at a lower point.

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General Hagner, United States Ordnance, in the letter transmitting the above report, suggests certain changes in the mechanism of the gun so as to cause each barrel to deliver its fire when in its lowest position.

"*Report on the Gatling gun,*" *by Alfred Gibbs, major of Seventh Cavalry, Fort Leavenworth, March* 16, 1868, considering "the carriage, limbers, and caissons vastly too heavy for the weight they are intended to carry," and suggesting lighter ones; stating that the lateral position of the firing-barrel causes a deflection in the line of fire in rapid firing, and also calling attention to the "slugging of the balls on the front transverse bar."

"*Report on the Gatling gun,*" *made by Bvt. Brig. Gen. P. V. Hagner, United States Ordnance, Watervliet Arsenal, April* 3, 1868, being a reply to the report of Major Gibbs, Seventh Cavalry, and considering the carriage, &c., sufficiently light.

"*Report on Gatling gun,*" *made by Bvt. Col. J. G. Benton, United States Ordnance, Hartford, July* 3, 1871, being an inspection-report, and contains a description of the new 'drum-feed."

"*Report of target-practice with the* 1-*inch Gatling gun*" *at the Artillery School at Fortress Monroe for the summer of* 1871, *made by Bvt. Maj. Gen. William F. Barry, colonel Second Artillery.*

Range in yards.	Projectiles.	Number of rounds fired.	Proportion of hits.	Remarks.
200	Solid shot	100	$\frac{7}{8}$	Target 6 feet by 6 feet.
300	Solid shot	100	$\frac{4}{5}$	Rate of fire: 70 to 80 shots per minute.
400	Solid shot	100	$\frac{1}{2}$	
500	Solid shot	100	$\frac{1}{4}$	
600	Solid shot	100	$\frac{1}{8}$	
200	Canister	100	$\frac{1}{4}$	The canister is apparently worthless beyond 200 yards; at 200 yards it is not very effective; at 150 yards there are many hits, but the pellets are too light to be valuable.

"*Report of target-practice with the* ½-*inch Gatling gun*" *at the Artillery School at Fortress Monroe, Va., February* 11, 1873, made under the direction of Bvt. Maj. Gen. W. F. Barry, colonel Second Artillery. Range, 900 yards; target, 24 feet by 6 feet; projectile, solid shot; number of rounds fired, 555; number of hits, 41; with the feed-drum 400 shots were fired in 1 minute and 10 seconds, with two instances of a cartridge fouling and causing delay.

"*Report on the use of the feed-drum with the Gatling gun,*" *made by Bvt. Maj. Gen. William F. Barry, Artillery School, Fortress Monroe, July* 8, 1873.—"I consider a feed-drum of some sort to be a most useful, perhaps *essential*, appendage to the ½-inch Gatling gun;" also suggests certain improvements in the drum.

"*Report* (*dated October* 28, 1870,) *of experiments with the Montigny mitrailleur and Gatling gun,*" *at Shoeburyness, England, in August and September*, 1870.—In the following experiments, the first was: "Firing against time, (two minutes,) at a line of targets 9 feet by 9 feet, representing 90 cavalry or 150 infantry." The second, firing five rounds deliberately; target same as before. The third, at 1,200 and 1,400 yards, "firing against time, (two minutes,) at a column of targets 9 feet by 9 feet, representing 90 infantry divided into three companies, 20 yards apart." At 2,070 yards the same targets were arranged to represent 36 cavalry or 45 infantry, divided into three troops or companies, 20 yards apart, firing as before. At 2,100 yards, firing at a line of the same targets, representing 30 cavalry or 50 infantry.

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Kind of gun.	Projectile.	Range in yards.	Number of rounds.	Number of hits.	Range in yards.	Number of rounds.	Number of hits.	Range in yards.	Number of rounds.	Number of hits.	Range in yards.	Number of rounds.	Number of hits.
FIRST EXPERIMENT.													
Mitrailleur	37 solid shot	300	5	171	600	6	127	800	5	154	1,000	6	33
Gatling gun, 0.42 inch	Single solid shot	300	616	369	600	657	522	800	357	299	1,000	483	62
12-pounder field-gun, B. L. R.	Case	300	9	268	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	Shrapnel	.....	.....	.....	600	7	142	800	6	152	1,000	7	218
Do	Segment	.....	.....	.....	.....	.....	.....	800	6	38	.....	.....	.....
9-pounder field-gun, M. L. R.	Case	300	10	208	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	Shrapnel	.....	.....	.....	600	7	283	800	5	118	1,000	8	294
Martini-Henry rifle	Single solid shot	300	141	74	600	146	52	800	136	66	1,000	124	47
Snider rifle	do	300	83	63	600	95	63	800	102	48	.....	.....	.....
Gatling gun, 1 inch	do	.....	.....	.....	.....	.....	.....	800	316	7	.....	.....	.....
SECOND EXPERIMENT.													
Mitrailleur	37 solid shot	300	5	172	400	5	177	600	5	107	800	5	106
Gatling gun, 0.42 inch	Single solid shot	.....	.....	.....	400	185	169	.....	.....	.....	800	185	183
12-pounder field-gun, B. L. R.	Case	300	6	138	400	5	118	.....	.....	.....	.....	.....	.....
Do	Shrapnel	.....	.....	.....	.....	.....	.....	600	5	164	800	5	203
9-pounder field-gun, M. L. R.	Case	300	5	162	400	5	110	.....	.....	.....	.....	.....	.....
Do	Shrapnel	.....	.....	.....	.....	.....	.....	600	5	78	800	5	124
Martini-Henry rifle	Single solid shot	300	129	83	400	122	90	600	115	74	800	117	85
Snider rifle	do	300	90	74	400	84	61	600	88	63	800	83	62
THIRD EXPERIMENT.													
Mitrailleur	37 solid shot	1,200	10	201	1,400	8	68	.....	.....	.....	.....	.....	.....
Gatling gun, 0.42 inch	Single solid shot	1,200	326	204	1,400	545	104	.....	.....	.....	.....	.....	.....
Gatling gun, 0.65 inch	do	.....	.....	.....	1,400	239	236	2,070	338	164	2,100	305	45
Gatling gun, 1 inch	do	.....	.....	.....	1,400	255	99	2,070	238	99	2,100	121	12
12-pounder field-gun, B. L. R.	Shrapnel	1,200	5	78	1,400	5	224	2,070	6	41	2,100	5	29
Do	Segment	1,200	6	173	1,400	7	102	2,070	6	115	2,100	9	73
9-pounder field-gun	Shrapnel	1,200	6	92	1,400	6	178	2,070	6	35	2,100	7	72
Do	Segment	1,200	6	99	1,400	7	90	2,070	6	60	2,100	6	52

FOURTH EXPERIMENT.

Firing at 134 dummies, placed in loose order on uneven ground, representing broken infantry retiring. The left of line was thrown back; front, 98 yards; average depth, 35 yards. Firing from three positions of unknown range, the distance being judged by the officers in command. In the field-guns shrapnel only was used.

Kind of gun.	First position.			Second position.			Third position.			Remarks.
	Estimated range in yards.	Rounds fired.	Hits.	Estimated range in yards.	Rounds fired.	Hits.	Estimated range in yards.	Rounds fired.	Hits.	
Gatling gun, 0.42 in.	300	453	312	650	736	162	950	736	177	The mean time of firing 5 rounds from the field-guns, viz, 2¼ minutes, was taken as the period for the other guns.
Mitrailleur	330	9	122	655	9	83	950	11	9	
9-pounder M. L. R.	400	5	74	700 to 800	5	34	1,000	5	47	
12-pounder B. L. R.	520	5	29	650	5	82	960	5	39	
Martini-Henry rifle	450	148	65	650	133	49	950	110	38	
Snider rifle	450	109	51	700	108	24	900	96	7	

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Result of a competitive trial between the Montigny mitrailleur and Gatling gun, 0.42 inch, at a row of ten 9 feet by 9 feet targets.

At 600 yards, 720 rounds from each, deliberately.
Mitrailleur: time, 4 minutes; hits, 538.
Gatling gun: time, 3 minutes 31 seconds; hits, 618.
At 800 yards, 555 rounds from each, delibertely.
Mitrailleur: time, 3 minutes 8 seconds; hits, 292.
Gatling gun: time, 2 minutes 26 seconds; hits, 439.
In the four experiments above given—
The Gatling gun, 0.42 inch, weighing 3 cwt., expended 492 pounds of ammunition, and scored 2,803 hits.
The mitrailleur, weighing 3 cwt., expended 472 pounds of ammunition, and scored 1,708 hits.
The 12-pounder B. L., weighing 8 cwt., expended 1,232.5 pounds of ammunition, and scored 2,286 hits.
The 9-pounder M. L., weighing 8 cwt., expended 1,013 pounds of ammunition, and scored 2,207 hits.
Five sets of single targets, 9 feet by 9 feet, six in each row, representing cavalry and infantry at unknown distances, not less than 1,000 yards.
Twelve-pounder B. L. R.: shrapnel; 5 rounds; hits, 4.
Nine-pounder M. L. R.: shrapnel; 5 rounds; hits, 44.
Gatling gun, 1 inch: solid shot; 270 rounds; hits, 16.
Mitrailleur: 37 solid shot; 10 rounds; hits, 3.
Martini-Henry rifle: 182 rounds; hits, 17.
Against time, (2 minutes,) at 800 yards; 3 rows of 45 feet by 9 feet targets, 15 yards apart, representing columns of infantry and cavalry.
12-pounder B. L. R.: segment; percussion fuse; 6 rounds; hits, 496.
9-pounder M. L. R.: shrapnel; percussion fuse; 7 rounds; hits, 254.
Mitrailleur: 37 solid shot; 11 rounds; hits, 81.
Gatling gun, 0.42-inch: single solid shot; rounds, 82; hits, 191.
The Gatling gun "worked stiffly and fire checked twice by cartridge jamming."

Extracts from the report furnishing the foregoing data.

"OCTOBER 28, 1870.

* * * * * * *

"The particular points for which the committee claim the superiority of the Gatling gun over the Montigny are as follows:

"1st. Greater destructive effect, owing to the rapidity with which it can be fired.

"2d. Greater command of range; the Montigny system being necessarily restricted to small calibers, whereas the Gatling is equally adapted to large as to small calibers.

"3d. The Gatling gun, so far as the experience of the committee goes, is capable of being worked by fewer men than the Montigny.

"4th. Greater strength and simplicity of mechanism.

"5th. Greater facility of repair, the locks of the Gatling being removable, and easily replaced in a few minutes if out of order or otherwise injured; whereas with the Montigny mechanism a similar accident renders the gun for the time unserviceable.

"6th. The greater demoralizing effect produced by the continuity of fire of the Gatling as compared with that of the Montigny.

"7th. The drum-arrangement affords a better means of carrying the ammunition uninjured than the plan proposed by Major Fosbery for the Montigny.

"The results of the recent inquiry have fully satisfied the committee of the expediency of introducing a certain proportion of these machine-guns, to act as auxiliaries to the other arms of the service, and, of the several designs which have been submitted for their consideration, including those that have been under trial, they are persuaded that the Gatling gun is the best adapted to meet all military requirements.

"To assist in defending such positions as villages, field-entrenchments, &c., the committee feel satisfied that the small Gatling would be found invaluable.

"For the defense of capounières for covering the approach to bridges or *têtes-de-pont*, for defending a breach, and for employment in advanced trenches or in field-works, where economy of space is of the utmost importance, the same sized Gatling would unquestionably be a most effective weapon.

"For naval purposes, the small Gatling would apparently be well adapted for use in the tops of vessels of war, to clear the enemy's decks or open ports; while for gunboats that carry only one heavy gun, and for boat operations, the medium-sized Gatling would be most effective in covering the landing of troops or for service up close rivers.

"The committee are also impressed with the effect produced by the medium-sized

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Gatling, 0.65-inch caliber, at long ranges, as compared with that of a field-gun, but looking to the weight of ammunition required to produce this effect, and to the exceptional conditions under which the larger Gatling could be used with advantage in the field, they are satisfied that a gun is far preferable at long ranges, and consequently they do not recommend the introduction of the larger description of Gatling for land-service

"In advocating the introduction of the small Gatling gun, the committee wish it to be distinctly understood that they do not for a moment contemplate their supplanting r displacing a single field-gun, the proportions of which have been laid down by the best military authorities as indispensable for an army in the field.

"The characteristics of the two weapons are essentially different. Except against an enemy in the open field, the fire of a mitrailleur is comparatively worthless, whereas artillery-fire will search out an enemy from almost any position, whether covered by trees, brushwood, earthworks, or houses, and at distances far beyond the range of a mitrailleur; but in the open field and at distances up to 1,200 yards, there is reason to believe that the latter will be found the more destructive, owing to the rapidity and continuity of its fire. * * * * * * *

"We have the honor to be, sir, your obedient servants,

"E. WRAY,
"*Colonel R. A., President.*
"F. A. FOLEY,
"*Captain R. N.*
"G. SHAW,
"*Colonel R. A.*
"H. C. FLETCHER,
"*Lieut. Col. Scots Fusilier Guards.*
"FRED. BEAUMONT,
"*Captain R. E.*
"W. H. NOBLE,
"*Captain R. E.*
"H. HEYMAN,
"*Lieutenant-Colonel, Secretary.*"

"The DIRECTORY OF ARTILLERY, *War-Office, Pall-Mall.*"

The following extracts are taken from the "*Second report of the* (English) *special committee on mitrailleurs*," dated November 28, 1871, the 0.65-inch-caliber Gatling gun being under consideration:

"The committee consider that, in addition to its employment on board ships of war, as already recommended, a gun of this caliber would be found excessively useful for the defense of coast-batteries against the attack of boats or for assisting in keeping down the fire of ships, engaging forts at close quarters, or attempting to force a passage by pouring an incessant fire into their ports. Such Gatlings, well served, would effectually put a stop to any attempt at landing, and would be more reliable at short range than field-guns.

"With regard to the small Gatling gun of 0.45 inch: The proper *rôle* for a gun of this caliber and power appears to the committee to be the defense of intrenched positions and villages, or for covering roads, defiles, bridges, or other narrow places along which an enemy may be expected to pass.

"Looking to the uncertainty of shell-fire, even with the best percussion or time fuses, there can be little doubt a body of troops having to advance to the attack of an intrenched position, *over any distance within* 1,200 *yards*, would suffer far more from Gatling guns delivering an incessant and wide-spread fire of the deadliest *mitraille* than from field-guns.

"The committee are unanimously of opinion that a proportion of Gatling guns, worked by the artillery and not exceeding the weight recommended in their report of 14. 3. 70—viz, 18 cwt.—should accompany every army in the field, for the specific purposes above detailed, and that they should be kept with the reserves for the express purpose of increasing infantry-fire at critical moments, in precisely the same way that guns of position are used for strengthening the fire of the field-artillery.

"As a rule, mitrailleures ("Gatling guns") should invariably be so intrenched as to bid defiance to the fire of field-guns, and be kept masked until the attack is fully developed and the enemy well within effective range. They should be provided with Nolan's range-finders.

"The committee do not share in the apprehension that great inconvenience would be caused to an army in the field by the addition to the reserves of a limited number of Gatling guns drawn by two horses each. The result of their experiments shows them that, in proportion to the weight of ammunition to be carried, the destructive effect against troops in the open field of the small Gatling gun, at *ranges within* 1,400 *yards*, is nearly three times that of the 9-pounder rifled M. L. field-gun, and there is every reason to expect that this so-called 'small Gatling' can be so materially reduced in weight,

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without detriment to its power and efficiency as to bring it, with its carriage and ammunition, within the powers of a single English cart-horse, thus further lessening the objection to it as inconveniently increasing the impedimenta of an army.

"The committee are decidedly averse to the employment of mitrailleurs for advancing with infantry, or indeed for attacking in any form, except when the enemy is provided with an inferior artillery or no artillery at all.

"An exception should be made in the case of mountain-batteries, for which the 0.45-inch Gatling gun, reduced in weight to 150 pounds, to fire from a tripod, seems eminently adapted as an adjunct to guns notoriously weak in their shrapnel and canister fire. This tripod Gatling gun may likewise prove useful in the tops of ships. In the present stage of the inquiry as regards the employment of the larger kinds of mitrailleurs under experiment in Russia and Austria, the committee recommend no trials, being inclined to doubt if they will ever be found so effective for working with cavalry as the horse-artillery gun.

"The committee think either description of Gatling gun would be found invaluable at a siege for purposes of defense on both sides; for the besiegers, in repelling sorties, in protecting the advanced works, particularly at night, or in assisting to keep down the fire of the place; on the part of the garrison, for sweeping the ditches, defending a breach, or for close fighting of any kind.

"In coming to the above conclusions, the committee have given full weight to the opinions of officers, foreign as well as British, who have had experience of the mitrailleur in the late war, and they have not overlooked the fact reported by Major-General Walker, in his letter dated Berlin, 4 10. '71, that a very large majority of the officers of the German army who have been consulted on the subject are against the introduction of the mitrailleur as a field-gun. With reference to these opinions, the committee would call attention to the following circumstances:

"1. That the Gatling gun was very little used by the French.

"2. That the French mitrailleur was almost as heavy, and required as many men and horses as the French field-gun.

"3. That the French appear, by all accounts, to have used their mitrailleurs with little judgment; firing them into all sorts of cover, at very long ranges, and without any special means of ascertaining the distances. They seem also to have frequently neglected the precaution of covering their mitrailleurs, either naturally or artificially, thus laying them open to destruction by the German artillery.

"4. That the Germans had no opportunity of testing the merits of mitrailleurs for defensive purposes, having almost invariably acted on the offensive.

"5. That the Germans have no necessity for considering the question of introducing these weapons, being already well provided with a very large number of French mitrailleurs, which, having recently been tried at Berlin, in comparison with Montigny and Gatling mitrailleurs, have been unanimously pronounced superior to either.

"With regard to the question of protecting the small Gatling with a light iron shield, the committee reserve their opinion until the pattern-gun has been tried."

A trial of the 0.50-inch-caliber Gatling gun (old model) was made at Fort Madison, near Annapolis, Md., October 23, 24, and 25, 1873, under the supervision of Lieut. Commander J. D. Marvin, United States Navy, during which 100,000 United States center-fire cartridges were fired to test the quality of the cartridges and the durability of the gun. The cartridges were made by the United States cartridge-factory at Lowell, Mass. The official report of these trials furnishes the following information:

"October 23, 10.33 a. m., commenced firing in the presence of Chief of Bureau of Ordnance and others. Ten drums, each holding 400 cartridges, (making 4,000,) were fired rapidly, occupying in actual time of firing ten minutes and forty-eight seconds. The firing was then discontinued to witness experimental firing of the 15-inch-caliber heavy gun. The firing of the Gatling gun was resumed in the afternoon, when some 28,000 cartridges were fired. Commenced firing at 8 50 a. m., October 24, the gun having been cleaned. One hundred and fifty-nine drums, of 400 cartridges each, making a total of 63,600 cartridges, were fired without stopping to wipe out or clean the barrels. At the close of the firing, which extended over a period of five hours and fifty-seven minutes, although the actual time of firing was less than four hours, the barrels were not foul to any extent; in proof of which a very good target was made at 300 yards range before cleaning the barrels. On the 25th day of October the remainder of the 100,000 cartridges were fired. The cartridges used in these trials contained a solid shot weighing 450 grains and a powder charge of 70 grains, being the service-charge for the 0.50-inch-caliber small-arms."

The report says: "The working of the gun throughout this severe trial was eminently satisfactory, no derangements of any importance whatever occurring."

The report also says that "ten drums (4,000) in rapid succession are, I think, as many as can be safely fired, for after that number of discharges the chambers of the barrels are at a temperature which, by the color test, is above 500 degrees Fahrenheit, a point which, it seems to me, endangers the fulminate in the cartridge within the open diaphragm of the drum. With the use of water, as practiced on the afternoon of the

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first and throughout the whole of the second day's trial, firing might with perfec safety proceed indefinitely, and at the most rapid rate possible."

The water was supplied by a watering-pot, requiring an additional man, but the report suggests the use of a receiver and siphon rose-head, by which the necessity of an additional man would be obviated.

DISCUSSION AND COMPARISON OF RESULTS.

1. The board have deemed it desirable to place a somewhat liberal construction upon the phraseology of the act of Congress under which they were appointed to conduct the trials herein recorded. The law, as well as the order, appointing the board provides for "experiments and tests of two Gatling guns of large caliber for flank-defense of fortifications," leaving to be decided by others what calibers should be tried, and also whether the experiments should be conducted with special reference to permanent works only, or should embrace detached field-fortifications and entrenched lines. The intention has been to make the tests sufficiently comprehensive to justify an expression of opinion as to the value of the Gatling gun for flanking purposes generally, in all kinds of works strengthened by flanks, whether requiring, under existing practices, an artillery-armament or otherwise.

The lines of defense in our permanent works are, with one or two exceptions, comparatively short. In works having high counterscarp-walls and deep ditches, the effective fire of the casemated flanking-guns is necessarily restricted to sweeping the ditch; in others, where the counterscarp is comparatively low, it can easily protect the terreplein of the covered way and reach the crest of the glacis, while, in exceptional cases, even the approaches to the work for some distance can be reached and commanded from the casemates with, slightly curved, fire delivered over the glacis.

In a few works, indeed, having neither counterscarp nor glacis, the flanking-guns have an unobstructed view of the approaches.

In order to flank the ditches only, ranges exceeding 200 yards will seldom be necessary, and an increase of 50 yards will, in most cases, attain and sweep the covered way.

Whenever the approaches to a permanent work can be seen or reached from the flank-casemates, the latter should of course be armed with guns having as long a range as the case requires, provided their effectiveness for flanking purposes at short ranges is not impaired thereby, one essential condition of such effectiveness being the capacity to deliver a rapid and intense fire at the critical moment.

The lengths of the lines of defense, or the range for flanking-guns, in some of our permanent works are given below.

Fort Warren, Boston Harbor, Massachusetts, has casemated flanks; the greatest range which the flanking-guns have to attain is 160 yards.

Fort Independence, Boston Harbor, Massachusetts, also has casemated flanks; but there being no counterscarp wall to intercept the fire, flanking-guns of long range are applicable.

In the fort at Clark's Point, New Bedford, Massachusetts, the flanking-guns would attain the opposite counterscarp with a range of 84 yards.

The fort at Sandy Hook, New York Harbor, if completed substantially according to the official plan, will have lines of defense on its longest front equal to 267 yards.

Fort Tompkins, New York Harbor, has casemated counterscarp-galleries for defending the ditch, the longest range for flanking-guns being 136 yards.

Fort Wadsworth, New York Harbor, has casemated flanks, the longest front being the gorge, where the range to the opposite counterscarp is 165 yards.

Fortress Monroe, Va., is partially casemated; the longest range for the flanking-guns, in order to reach the opposite counterscarp, is 208 yards.

Some of the flank-casemates see over the counterscarp and command the approaches, and might advantageously be armed with long-range flanking-guns.

Fort Pulaski, Ga., has casemated flanks on the gorge-face to protect the bridge over the ditch; distance from flanks to opposite counterscarp, 158 yards.

Fort Clinch, Amelia Island, Fla., has casemated flanks; longest range, to the crest of the glacis, 191 yards.

This brief list comprises works as unlike each other in relief and general design as the entire catalogue of permanent fortifications designed for the defense of our coast affords. In some, like Fort Wadsworth, the heavy guns, as well as those for flank-defense, are arranged tier above tier, thus concentrating a large armament upon a small area; in others, like Fortress Monroe, the work covers a large space and delivers but one tier of fire from heavy guns. We have not, probably, half a dozen works, either completed, under construction, or projected, having lines of defense exceeding 200 yards in length; and, although there are quite a number in which suitable guns in the flank-casemates could command the approaches for a much greater distance, the necessity for far-reaching flanking-guns in these cases is not deemed imperative, for the reason that the terrepleins of the flanks carry heavy

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guns, mounted *en barbette*, available for the longer ranges. There would seem, therefore, to be no existing reason for the substitution of long-range for short-range guns in the casemated flanks of our permanent works, unless we shall secure thereby a more intense fire at short range than we now possess, and that, too, without sacrificing any essential feature of the existing method of flank-defense by howitzers. One feature of the defense by howitzers is their capability of throwing shells. These are sometimes necessary for sweeping away temporary works improvised by an enemy's column, to cover their approach, especially in crossing the ditch in an open assault. When the barbette-guns can be relied upon for this purpose, the necessity for retaining shell-guns only in the flank-casemates is not obvious. In the general case, however, as preliminary to any open assault except a *coup-de-main*, either the barbette-fire of the besieged is destroyed or arrangements are made to keep it subdued or silent during the critical period of the attack.

2. In field-fortifications, whether the guns for flank-defense are arranged to fire through open embrasures between merlons or otherwise, they generally command the approaches for a considerable distance; and a gun that can deliver a rapid and intense fire, effective at both long and short ranges, is very desirable. Indeed, their power to attain an enemy's column at a long distance obviates, in a measure, proportional to their efficiency, the necessity for using shell-guns, or any other flanking-guns, at close range, The same is true not only of a line or lines of detached field-works located in such defensive relations to each other that the guns of one work flank the faces and sweep the approaches of those adjacent to or in advance of it, but also of continuous lines of intrenchments, with salient points, at intervals armed with artillery to defend the approaches and flank the retired portions. Under these circumstances ranges for flanking-guns of 1,000, 1,200, or even 1,400 yards are not deemed excessive; and the gun that can deliver the most effective fire against troops at these distances must be regarded as the best, other things, including efficiency at short ranges, being equal. If, in addition, this hypothetical gun shall have proved itself capable not only of *delivering* but of *maintaining* uninterruptedly for hours a most destructive fire at all distances, indifferently, from fifty yards up to and beyond a mile, a power conspicuously absent in our present service-ordnance, its introduction into the armament of our fortifications, as an auxiliary, would seem to be an obvious necessity. The Gatling gun is such an arm, and is, beyond question, well adapted to the purposes of flank-defense at both long and short ranges.

3. The 0.42-inch or 0.45-inch-caliber Gatling gun can easily fire 400 rounds per minute continuously for hours, with the necessary reliefs at the crank. The 1.00-inch-caliber Gatling gun can fire 155 to 160 shots per minute, but requires more frequent reliefs at the crank than the smaller calibers.

4. *Results at* 150 *yards.*

Canvas target 9 feet high by 45 feet wide. Guns on trial; 0.42-inch-caliber Gatling gun; 1.00-inch-caliber Gatling gun; 4.62-inch-caliber bronze gun, 12-pounder Napoleon; 40 Springfield rifles, 0.45-inch caliber.

	Number of shots fired.	Number of hits.
The 0.42-inch-caliber Gatling gun, firing solid shot; time, 1 minute 29¼ seconds	605	594
	Number of balls fired.	**Number of hits.**
The 12-pounder Napoleon gun, firing six rounds of double special canister, each canister containing twelve lead balls three-quarters of an inch in diameter; time, 1 minute 34 seconds	1,452	601

In this instance the Gatling gun, if the firing had been continued with the same ratio of hits up to one minute thirty-four seconds, (the time occupied in firing six rounds from the Napoleon,) would have put 633 shots through the target; and it would, moreover, have been by far the most effective weapon of the two against troops on account of the greatly superior penetration attained with it, the canister-balls passing through but three thicknesses of one-inch yellow-pine boards, while the shots from the Gatling

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gun penetrated six thicknesses. The killing and disabling effects of a projectile in a column of troops is, within certain undefined limits, proportional to its penetrating power.

	Number of balls fired.	Number of hits.
The 1.00-inch-caliber Gatling gun, firing canister containing twenty-one lead balls, each ball 0.45-inch diameter and weighing 144 grains; 255 rounds fired; time, 1 minute 29¼ seconds	5,355	1,595
40 Springfield rifles, firing 1 minute 30 seconds	614	428

The canister-projectiles here used, although giving a large number of hits in a brief time, are not considered effective, on account of the smallness of the balls and their slight penetration. The maximum penetration for direct hits is scarcely one 1-inch yellow-pine board. It will be seen below that at 200 yards, (a suitable range for canister,) the penetration is less than half an inch. The disabling effects of these projectiles against any kind of troops would be insignificant in comparison with those produced by the solid shot from the 0.42-inch or 0.45-inch-caliber Gatling gun, or even by the special canister from the 12-pounder Napoleon gun, or the 8-inch siege-howitzer, at the same range.

Penetration at 150 yards into 1-inch yellow-pine boards, separated by 1-inch interrals.

	Maximum.	Minimum.	General.
0.42-inch-caliber Gatling gun	.....	.....	6 to 7 boards.
1.00-inch-caliber Gatling round canister, 0.45 inch diameter	1 board	.....	1 board.
12-pounder Napoleon lead canister, 0.75 inch diameter	3 boards, full.	2 boards	3 boards.
8-inch howitzer canister, 0.75 inch diameter	3 boards	1 board	2 boards.
8-inch howitzer canister, 0.97 inch diameter	3 boards, full.	2 boards	3 boards.

5. *Results at 200 yards.*

Canvas target, 9 feet high by 45 feet wide. Guns on trial: 0.42-inch-caliber Gatling gun; 1.00-inch-caliber Gatling gun; 4.62-inch bronze gun, 12-pounder, Napoleon; 8-inch siege-howitzer; 40 Springfield rifles, caliber, 0.45 inch.

	Number of shots fired.	Number of hits.
0.42-inch-caliber Gatling gun, firing solid shot, (Lowell projectile;) time, 1 minute 29¼ seconds; first trial	637	618
0.42-inch-caliber Gatling gun, firing solid shot, (Lowell projectile;) time, 1 minute 29¼ seconds; second trial	550	530
	Number of slugs fired.	
1.00-inch-caliber Gatling gun, firing canister containing 18 cylindrical slugs, each 0.45 inch diameter by 0.45 inch long, and weighing 199 grains; 213 rounds; time, 1 minute 29¼ seconds	3,834	846

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	Number of balls fired.	Number of hits.
1.00-inch-caliber Gatling gun, firing canister, (described in the foregoing paragraph;) 230 rounds fired	4,830	1,172
12-pounder Napoleon; (4.62-inch caliber,) firing double special canister, each containing 121 lead balls, 0.75 inch diameter; number of double rounds, 6; time, 1 minute 35 seconds	1,452	379
8-inch siege-howitzer, firing single service-canister containing 48 iron balls 1.85 inch diameter; number of rounds fired, 4; time, 1 minute 32½ seconds	192	52
8-inch siege-howitzer, firing single special canister containing 208 lead balls 0.977 inch diameter; number of rounds fired, 4; time, 2 minutes 1½ seconds	832	312
8-inch siege-howitzer, firing single special canister containing 440 lead balls 0.75 inch diameter; number of rounds fired, 4; time, 1 minute 26½ seconds	1,760	570
8-inch siege-howitzer, firing double special canister, each containing 440 lead balls 0.75 inch diameter; 4 rounds fired deliberately	3,532	1,463
40 Springfield rifles, caliber 0.45; time 1 minute 30 seconds.	601	320
40 Springfield rifles, fired deliberately in 3 minutes 54½ seconds	600	436

Penetration at 200 yards into 1-inch yellow-pine boards, separated by 1-inch interval.

	Maximum.	Minimum.	Average.
0.42-inch Gatling gun			6 boards = 6 inches.
1.00-inch Gatling gun round canister, 0.45 inch diameter.	0·70 board = 0.70 inch	0.23 board = 0.23 inch	0.45 board = 0.45 inch.
1.00-inch Gatling gun slugs, 0.45 inch diameter.			Much less than round canister.
12-pounder Napoleon lead canister, 0.75 inch diameter.	3 boards	2 boards	Scant 3 b'ds.
8-inch howitzer lead canister, 0.75 inch diameter.	3 boards	1 board	1½ boards.
8-inch howitzer lead canister, 0.97 inch diameter.	3 boards	1 board	2 boards.

Upon the results of the foregoing competitive trials at ranges of 150 and 200 yards, reference being also had to the diagrams of the targets, it may be remarked as follows, viz:

First. At 150 yards the 12-pounder Napoleon gun, firing double special canister, and the 0.42-inch-caliber Gatling, used with the oscillator so as to cover the target laterally, are about equal in number of hits. The 12-pounder, however, made the best target, for want of sufficient dispersion vertically in the Gatling.

On the other hand, this deficiency is, perhaps, more than compensated by the superior penetration of the latter.

Second. At both 150 and 200 yards the 1.00-inch-caliber Gatling, firing canister containing either slugs or round balls, cannot be deemed an effective arm, unless the penetration can be increased, for many of the shots would be stopped by the clothing worn by the soldiers, and many others would fail to inflict disabling wounds.

The canister-ammunition used by the board contained only coarse-grained powder adopted for previous trials, when the case was made of thin metal. As the thickness and strength of the case has been greatly increased, a fine-grain quick powder is admissible, and much better results can reasonably be expected from it.

It is the intention of the company to use fine-grained musket-powder for all canister-ammunition prepared hereafter for the 1-inch gun.

Third. Forty Springfield rifles, served with average skill, are equal to one 0.42-inch-caliber Gatling gun in the number of shots delivered in a given time; but at 150 yards the latter gave 38 per cent. more hits than the former; and at 200 yards, 79 per cent.

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more. The forty rifles, however, covered the targets better than the Gatling, and for an equal number of hits would have been more effective against a deep column of troops on account of their greater dispersion vertically.

Reckoned simply by the number of hits in the target, one 0.42-inch-caliber Gatling, using the oscillator, is equal to seventy Springfield rifles firing against time, and fifty-two rifles firing deliberately. Without the oscillator every shot from the Gatling should strike the target.

Fourth. At 200 yards the 8-inch howitzer, firing double special canister, gave more hits than the 0.42-inch-caliber Gatling, used with the oscillator, in the proportion of 1,463 to 574, (average.)

At 200 yards, and probably at 250 yards, one 8-inch howitzer firing this canister would, therefore, be superior in number of hits to two 0.42-inch-caliber Gatling fired with the oscillator; but this superiority, if it exist at all, in delivering disabling hits against troops, is probably restricted to ranges not exceeding 200 yards, bearing in mind the great difference in penetration recorded above. The howitzer covers the target vertically much better than the Gatling.

Fifth. The great inferiority of the 8-inch service-canister containing 48 iron balls is strikingly shown by the record. At 200 yards it gave but 52 hits, as against 312 hits with the largest lead canister, and 570 hits with the smallest; four rounds being fired in each case.

The service-canister for the 24-pounder flank-defense howitzer contains the same number of iron balls (48) as the 8-inch service-canister; but as the balls are much smaller in the former than in the latter, being, indeed, only a little more than one-third as heavy, their range, penetration, and general effectiveness would be proportionally less, giving for 4 rounds at 200 yards probably not more than 25 or 30 disabling hits.

But if filled with lead balls, 0.75 inch diameter, the 24-pounder howitzer canister, retaining the prescribed weight of the finished projectile, would contain about 170, and would doubtless be quite as effective, in proportion to the number of lead balls fired, as the special 8-inch canister, delivering, in four single rounds at 200 yards, upwards of 200 disabling hits in a target of the dimensions used.*

Results at 500 yards.

Canvas target 9 feet high by 45 feet wide. Guns on trial: 0.42-inch-caliber Gatling gun; 4.62-inch-caliber bronze gun, 12-pounder Napoleon; 8-inch siege-howitzer.

	No. of shots fired.	No. of hits.
0.42-inch-caliber Gatling gun, firing solid shot; time, 1 minute 30 seconds.	600	577
12-pounder Napoleon with time-fuse, firing spherical case containing 82 lead balls 0.69-inch diameter; 7 rounds fired; time, 1 minute 30 seconds.	574 lead balls.	55
12-pounder Napoleon, 6 rounds fired; time, 1 minute 30 seconds.	492 lead balls.	184
8-inch siege-howitzer with time-fuse, firing spherical case containing 486 lead balls 0.69 inch diameter; 4 rounds fired; time, 1 minute 30 seconds.	1944 lead balls.	112
RESULTS AT 800 YARDS.		
Same target and same guns as at 500 yards.		
0.42-inch-caliber Gatling gun, firing solid shot, deliberately, (aim unknowingly too high.)	600	106
0.42-inch-caliber Gatling gun, firing solid shot, deliberately..	600	534
12-pounder Napoleon gun with time-fuse and spherical case, as above; 7 rounds, fired deliberately.	574 lead balls.	3
12-pounder Napoleon gun with time-fuse and spherical case, as above; 7 rounds, fired deliberately.	574 lead balls.	35
8-inch siege-howitzer with time-fuse and spherical case, as at 500 yards; 4 rounds, fired deliberately.	1944 lead balls.	0

*A number of explosive bullets were fired from the 1-inch Gatling gun into the penetration target at a distance of 200 yards. They usually penetrated three or four boards, and then burst, splintering the target considerably. The shattering effect, however, appeared to be greatly diminished by the intervals between the boards, and would doubtless have been much greater in solid wood.

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This record shows in a striking manner the vast superiority of the Gatling gun against troops at ranges beyond effective reach of canister, or, say, beyond 250 yards; for the projectiles in competition with it, whether case-shot or shell, are subject to a variety of disadvantageous conditions, more or less beyond control, among which may be enumerated the inaccuracy common to smooth-bore guns; the varying effects of the wind, due to changes in either force or direction, or to both; the eccentricity of the projectiles and the imperfection of fuses, the latter having been, during the trials of the board, a conspicuous and fruitful cause of the very poor results obtained.

At 500 yards, 1 Gatling, fired with oscillator, gave 58 per cent. more hits than 2 12-pounder Napoleons and 1 8-inch howitzer together, each firing 1 minute 30 seconds.

At 800 yards the proportions of hits were very largely increased in favor of the Gatling, there being an average of 320 hits for 1 Gatling against an aggregate of only 38 hits for 2 Napoleons and 1 howitzer.

Some of the shells did not explode at all, while others burst either too soon or too late to be effective.

In some cases the fuse blew out without bursting the shell. There were only a few bad line-shots, and it was not considered that the pieces were unskillfully served. Neither was the wind unusually high while firing with shell and case-shot. Indeed, no abnormal condition prevailed in any marked degree, and the failure to achieve good results was due directly to characteristic defects in the kind of ammunition used, not under certain and uniform control of existing knowledge or skill on this subject. The ammunition had been prepared with great care by Major Baylor, and in average excellence was not regarded as inferior in quality.

Results at 1,000 to 1,150 yards.

Targets representing a column of infantry. Guns on trial: 0.42-inch-caliber Gatling gun; 4.50-inch-caliber siege-rifle; 8-inch siege-howitzer.

The firing at ranges from 1,000 to 1,150 yards was made at a series of targets representing a regiment of infantry in a column of companies, at full distance, approaching or retiring from the battery, the nearest company being 1,000 yards and the farthest 1,150 yards distant from the gun.

The targets were made of 1-inch yellow-pine boards; were each six feet high and 50 feet wide; and placed, one behind the other, 50 feet apart.

The diagrams of targets and the target-records show the number and location of hits in each target.

Only the aggregate number of hits in the entire column is given below for each piece. Time assumed to be the same for each; it having been ascertained by trial that the 8-inch howitzer and 4½-inch rifle could each fire 4 rounds while the Gatling gun was firing 600 shots.

	No. of shots fired.	No. of hits.
0.42-inch-caliber Gatling gun	600	526
0.42-inch-caliber Gatling gun	600	691
4.50-inch rifle, shrapnel, 4 rounds	672	334
4.50-inch rifle, shrapnel, 4 rounds	672	164
8-inch siege-howitzer, spherical case No. 2 containing 470 lead balls, 14 to the pound, 4 rounds.	1880	615
8-inch siege-howitzer, spherical case No. 2 containing 420 lead balls, 14 to the pound, 4 rounds.	1880	407

In these trials the same causes already noticed operated to prevent good results with the case-shot. Some did not burst at all; some passed the column of targets before bursting; several fell short, and a few had so great a lateral deviation as to be lost.

With a time-fuse, that at 1,000 to 1,200 yards would burn uniformly to within half a second of the time to which it is cut, the 8-inch howitzer ought to give many more hits in a column of targets like those used than the small Gatling gun. The percussion-fuses, used with the shrapnel from the 4½-inch rifle, proved to be equally unreliable. As a rule, they cannot be depended upon, after making a reasonable allowance for contingencies, to explode when the projectile strikes; and this uncertainty, taken in connection with the erratic flight of some projectiles, which were entirely lost, and the meager results, due to the want of desired precision in others, renders their aggregate effectiveness variable and capricious.

In the column of targets the Gatling gun gave 17 per cent. more hits than the 8-inch howitzer and 144 per cent. more than the 4½-inch rifle.

In the trials at Shoeburyness, reported the 28th of November, 1871, the same difficulty

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was encountered. In referring to it the committee remark as follows: "Looking to the uncertainty of shell-fire, even with the best percussion or time fuses, there can be little doubt that a body of troops having to advance to the attack of an intrenched position *over any distance within* 1,200 *yards*, would suffer far more from Gatling guns delivering an incessant and wide-spread fire of the deadliest *mitraille* than from field-guns."

Results at 1,200 *yards.*

Target 9 feet high by 45 feet wide. At 1,200 yards the only gun tried by the board was the 0.42-inch Gatling. Two trials were made, firing deliberately without the oscillator.

	Number of shots fired.	Number of hits.
First trial	600	180
Second trial	600	413

The oscillator not having been used the target was not well covered by the shots in either case, the lateral dispersion on the first trial being 27 feet, and on the second 30 feet. With an oscillator covering a sector of 3 degrees, as now arranged, the lateral dispersion at 1,200 yards would be 188 feet, assuming the projectiles to fly in the vertical plane of sight, and the number of hits would not have exceeded one-fifth to one-fourth of those really obtained.

A sector of 1 degree embraces a target 62 feet wide 1,200 yards distant.

Although the advantages, for target-practice, where the hits cannot be seen even with a glass, of an automatic oscillator adjustable at pleasure for any sector from zero to 10 or 12 degrees are plainly obvious, it does not follow that such a mechanism is equally necessary under all circumstances, when operating against troops, for the reason that in the latter case the points reached by the projectiles (unless the firing is very bad) and the effects produced can generally be observed from the gun, and the direction and elevation of the piece adjusted and varied, from time to time, as circumstances require. But in order to leave as little as possible to the judgment of the enlisted men, by whom in actual service the gun will be served, and thereby secure the best results, an adjustable automatic oscillator is considered desirable.

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Recapitulation of trials by the board, arranged according to distances of target from the gun.

Number of trial.	Kind of gun.	Range in yards.	Projectile.	Fuse.	Elevation.	Number of rounds fired.	Number of projectiles thrown.	Number of hits.	Time of firing.	Remarks.
				Secs.	° ′				*m.* *s.*	
1	12-pdr Napoleon gun	150	Double special canister, each containing 121 lead balls 0.75 inch in diameter and 11 to the pound.	.....	0 30	6	1,452	601	1 34	
2	40 Springfield rifles	150	Single solid shot	.....	.....	614	614	428	1 30	Brisk wind from left to right.
3	Gatling gun, cal. 1 inch	150	Canister, each containing 21 lead balls 0.45 inch in diameter.	.....	.....	255	5,355	1,595	1 29½	Upright cases used.
4	Gatling gun, cal. 0.42 inch	150	Single solid shot	.....	.....	605	605	594	1 28½	Upright cases used.
5	8-inch siege-howitzer	200	Single special canister, each containing 208 lead balls 0.977 inch in diameter.	.....	1 00	4	352	312	2 15	In this trial the men waited for the command to fire to be given.
6	8-inch siege-howitzer	200	Service-canister, each containing 48 iron balls 1.85 inches in diameter.	.....	1 00	4	192	52	1 32½	Firing as rapidly as possible.
7	8-inch siege-howitzer	200	Single special canister, each containing 440 lead balls 0.75 inch in diameter.	.....	1 30	4	1,760	570	1 26½	Firing as rapidly as possible.
8	12-pdr Napoleon gun	200	Double special canister, each containing 121 lead balls 0.75 inch in diameter.	.....	1 45	6	1,452	379	1 35	Firing as rapidly as possible.
9	8-inch siege-howitzer	200	Double special canister, each containing 440 lead balls 0.75 inch in diameter.	.....	1 30	2	1,760	718	.....	Target too much shattered to complete the four rounds contemplated.
10	8-inch siege-howitzer	200	Double special canister, each containing 440 lead balls 0.75 inch in diameter.	.....	1 30	4	3,520	1,463	Deliberately.	Brisk wind across line of fire from left to right.
11	Gatling gun, cal. 0.42 inch	200	Single solid shot	.....	.....	637	637	618	1 29½	Feed-drum used.
12	Gatling gun, cal. 0.42 inch	200	Two-ball cartridges	.....	.....	272	544	414	1 29½	One case clogged and delayed firing.
13	Gatling gun, cal. 0.42 inch	200	Single solid shot	.....	.....	550	550	530	1 29½	Upright cases used.
14	Gatling gun, cal. 1 inch	200	Canister containing 18 cylindrical slugs	.....	0 30	213	3,834	846	1 29½	Upright cases used.
15	Gatling gun, cal. 1 inch	200	Canister containing 21 round balls	.....	0 30	230	4,830	1,172	1 29½	Upright cases used.
16	40 Springfield rifles	200	Single solid shot	.....	.....	601	601	320	1 30	Brisk wind from left to right.
17	40 Springfield rifles	200	Single solid shot	.....	.....	15 ea.	600	436	Deliberately.	Brisk breeze from left to right.
18	12-pdr Napoleon gun	500	Spherical case	1½	1 15	6	492	184	1 30	Fourth round did not burst; fifth round burst beyond target.
19	12-pdr Napoleon gun	500	Spherical case	1½	1 15	7	574	55	1 31	
20	8-inch siege-howitzer	500	Spherical case	1¼, 2, 2, 2¼	2, 2 30, 3, 4	4	1,944	112	Deliberately.	
21	Gatling gun, cal. 0.42 in	500	Single solid shot	.....	.....	600	600	557	..do	
22	12-pdr Napoleon gun	800	Spherical case	2, 3, 3, 3, 3, 3	2 00	7	.....	3	..do	All except the last shot burst beyond the target.
23	12-pdr Napoleon gun	800	Spherical case	2¼, 2¼, 2¼, 2, 2, 2, 2	2 00	7	.....	35	1 30	Two did not burst, and three burst beyond the target.

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Recapitulation of trials by the board—Continued.

Number of trial.	Kind of guns.	Range in yards.	Projectile.	Fuse.	Elevation.	Number of rounds fired.	Number of projectiles thrown.	Number of hits.	Time of firing.	Remarks.
				Secs.	° ′				*M. S.*	
24	8-inch siege-howitzer	800	Spherical case	3½	6½ 00	4	.....	.....	Deliberately.	All failed to explode.
25	Gatling gun, cal. 0.42 in.	800	Single solid shot	.....	.....	600	600	106	..do	Aim too high and to left.
26	Gatling gun, cal. 0.42 in.	800	Single solid shot	.....	.....	600	600	534	..do	Brisk breeze across line of fire.
27	Gatling gun, cal. 0.42 in.	1,200	Single solid shot	.....	.....	600	600	160	..do	
28	Gatling gun, cal. 0.42 in.	1,200	Single solid shot	.....	.....	600	600	413	..do	
29	4¼-in. rifled gun	1,000 to 1st target.	Shrapnel	Schenkl perc'n.	2 50	4	672	334	1 30	One shell did not burst.
30	4¼-in. rifled gun	1,000 to 1st target.	Shrapnel	Schenkl perc'n.	2 45	4	672	164	liberately.	One burst beyond target.
31	8-inch siege-howitzer	1,000 to 1st target.	Spherical case	4½	6 10	4	1,880	615	..do	One lost to right of target.
32	8-inch siege-howitzer	1,000 to 1st target.	Spherical case	4½	6 10	4	1,880	407	..do	But one shell burst in column.
33	Gatling gun, cal. 0.42 in.	1,000 to 1st target.	Single solid shot	.....	2 00	600	600	526	..do	Aim too low.
34	Gatling gun, cal. 0.42 in.	1,000 to 1st target.	Single solid shot	.....	2½ 00	600	600	691	..do	In the last six trials ten targets 6 feet by 50 feet, of 1-inch yellow-pine boards, representing a column of ten companies at full distance, the nearest being 1,000 yards from gun. In all the others a canvas target 45 feet by 9 feet was employed.

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Comparative effect of the 0.42-inch Gatling gun, and other guns placed in competition with it by the board, showing the weight of ammunition expended, and the number of hits scored in a given time, viz, 1 minute 30 seconds.

Range in yards.	8-inch siege howitzers.		12-pounder Napoleon gun.		0.42 inch Gatling gun.		40 Springfield rifles.		4½-inch rifle.		Remarks.
	Weight of ammunition in pounds.	Number of hits.	Weight of ammunition in pounds.	Number of hits.	Weight of ammunition in pounds.	Number of hits.	Weight of ammunition in pounds.	Number of hits.	Weight of ammunition in pounds	Number of hits.	
150	.....	.....	186	601	91	594	60	428	.....	.....	
200	232	312	.....	.....	.....	.....	.....	.....	.....	.....	Firing single special canister of lead balls 5 to the pound.
200	230	52	.....	.....	.....	.....	.....	.....	.....	.....	Firing single service-canister.
200	232	570	.....	.....	.....	.....	.....	.....	.....	.....	Firing single special canister of lead balls 11 to the pound.
200	448	1,463	186	379	86	574	58	320	.....	.....	8-inch howitzer and 12-pounder, firing double special canister of lead balls 11 to the pound.
500	254	112	112	120	88	557	.....	.....	.....	.....	
800	254	.....	120	19	88	320	.....	.....	.....	.....	
1,000	265	511	.....	.....	88	609	.....	.....	140	249	At 6 targets, 50 by ten feet, representing a column of 10 companies at full distance; nearest company 1,000 yards from gun.
Total	1,915	2,981	604	1,119	441	2,654	118	748	140	249	
Average in given time.	274	426	151	280	88	531	59	374	140	249	

Comparative effect of the 0.42-inch Gatling gun, and the other guns placed in competition with it calculated from the foregoing table for a constant weight of ammunition, viz, 297 pounds being the weight of ammunition carried in the limber-box of the Gatling gun, 0.42-inch caliber.

Range in yards.	Weight of ammunition.	Number of hits for 8-inch howitzer.	Number of hits for 12-pounder Napoleon gun.	Number of hits for Gatling gun.	Number of hits for Springfield rifles.	Number of hits for 4½-inch rifle.	Remarks.
150	297	.....	960	1,939	2,119	.....	12-pounder, firing double special canister of lead balls 11 to the pound.
200	297	399	.....	.....	.....	.....	Single special canister of lead balls 5 to the pound.
200	297	730	.....	.....	.....	.....	Single special canister of lead balls 11 to the pound.
200	297	67	.....	.....	.....	.....	Single service-canister.
200	297	970	605	1,982	1,639	.....	8-inch howitzer and 12-pounder, firing double special canister of lead balls 11 to the pound.
500	297	131	318	1,880	.....	.....	8-inch howitzer and 12-pounder, firing spherical case.
800	297	.....	47	1,080	.....	.....	Do. Do. Do.
1,000	997	573	.....	2,055	.....	528	At ten targets, 50 feet by 6 feet, representing a column of companies at full distance, the nearest company being 1,000 yards from gun; 8-inch howitzer and 4½-inch rifle, firing case-shot.
Total	2,376	2,870	1,930	8,936	3,758	528	
Average.	297	410	482	1,787	1,879	528	

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Views and recommendations of the board.

I. Among the advantages possessed by the Gatling gun may be enumerated the lightness of its parts; the simplicity and strength of its mechanism; the rapidity and continuity of its fire without sensible recoil; its effectiveness against troops at all ranges for which a flanking-gun is required; its general accuracy at all ranges attainable by rifles; its comparative independence of the excitement of battle; the interchangeableness of its ammunition with the same caliber of small-arms, and its great endurance.

II. Its disadvantages, compared with howitzers and other shell-guns, are, its inability to deliver a curved fire so as to reach an enemy behind intervening obstacles, or to search his rifle-pits and covered ways; its want of effectiveness against troops covered by even the slightest intrenchments, or lodged in villages and houses, or in heavy woods; and, generally, its entire deficiency in breaching-power.

III. In permanent fortifications, where the lines of defense do not exceed two hundred yards, and therefore very generally in our permanent works, nothing would be gained by using the Gatling 0.42-inch gun for flanking purposes instead of the 8-inch howitzer, firing the special canister devised by the board. In special cases, where the flanking-guns can fire over the counterscarp and command the approaches for a considerable distance, the Gatling gun, being good at both long and short ranges, could be advantageously introduced as an auxiliary.

IV. For the defense of detached field-fortifications, placed in defensive relations to each other, and intrenched positions with long lines of defense, the Gatling gun would be superior to any other species of artillery against troops exposed to view, and therefore a most valuable auxiliary to shell-guns.

V. One advantage possessed by the Gatling gun is its lightness, and hence the ease with which it can be withdrawn from position, when exposed to breaching-batteries or any overpowering or disabling fire, and replaced in battery to meet the critical moment of an assault.

VI. The board recommend the adoption of the Gatling gun as an auxiliary arm for flanking purposes, but not to any very considerable displacement of shell-guns, in any locality or under any circumstances. The caliber of the Gatling gun adopted should be the same as that of the service small-arm, so that the ammunition will be interchangeable between the two.

VII. The 1-inch caliber Gatling gun possesses no special advantages for flanking purposes. In rapidity of fire it is greatly inferior to the smaller calibers, and this inferiority is not compensated by the greater weight and longer range of the 1-inch solid shot, while the 1-inch canister projectiles, whether filled with spherical balls or cylindrical slugs, cannot, with the penetrations obtained by the board, be considered an effective missile against troops at one hundred and fifty to two hundred yards, while beyond two hundred yards it would be comparatively harmless. With quicker powder, it would doubtless give better results.

VIII. The service-canister for the 8-inch siege-howitzer is manifestly very much inferior to the special canister used by the board. This remark, of course, applies equally to other calibers. It is therefore recommended that the use of round cast-iron balls for canister be discontinued, and that lead balls not lighter than 11 to the pound be substituted therefor. Balls 8 to the pound would perhaps be still better. But for the use of this special canister the 0.42-inch Gatling gun would in all cases have given the best results in the competitive trials had before the board.

IX. Although the board is not prepared to state to what precise extent the Gatling gun should be introduced into that portion of the armament of fortifications intended, either specially or contingently, to be used for flanking purposes, the proportion of one Gatling gun for one shell-gun is suggested. It is believed the number of Gatlings ought not to exceed the number of shell-guns.

X. It is further suggested that the Gatling Gun Company be requested to devise and manufacture for trial two casemate-carriages for their 0.45-inch gun, to be placed side by side in one flank-casemate, the carriages to be so arranged, if practicable, that the centers of motion for elevating and depressing the piece, as well as for changes in the direction of fire, shall be at the throat of the embrasure; also that the company be requested to devise an improvement in the oscillator, as suggested in the remarks under the head of "Results at 1,200 yards."

XI. The board have necessarily limited the scope of their recommendations to the restricted field of inquiry contemplated in the order, and have therefore not touched upon the most prominent advantages claimed and generally conceded for the Gatling gun. Among these may be enumerated its peculiar power for the defense of intrenched positions and villages; for protecting roads, defiles, and bridges; for covering the embarkation or debarkation of troops, or the crossing of streams; for silencing field-batteries or batteries of position; for increasing the infantry-fire at the critical moment of a battle; for supporting field-batteries and protecting them against cavalry or infantry charges; for covering the retreat of a repulsed column; and, generally, the accuracy,

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continuity, and intensity of its fire, and its economy in men for serving and animals for transporting it.

It is suggested that the relations which this gun shall occupy to the different arms of service should be prescribed by competent authority.

Respectfully submitted.

Q. A. GILLMORE,
Maj. Engineers, Brt. Maj. Gen.
T. J. TREADWELL,
Maj. Ordnance.
L. LORAIN,
Capt. Third Artillery.

NEW YORK, *January* 16, 1874.

ORDNANCE-OFFICE, *January* 21, 1874.

The foregoing report is respectfully submitted to the Secretary of War with the following recommendations:

1st. The adoption of the Gatling gun, caliber 0.45, using the service-cartridge, as an auxiliary arm for flank-defense of fortifications.

2d. The adoption of a special canister for 8-inch flank-defense howitzer, to contain lead balls.

3d. The designing and manufacturing of two casemate-carriages for the Gatling gun, as suggested by the board.

4th. The adoption of the Gatling gun, caliber 0.45, as an auxiliary arm for all branches of the service.

5th. The appointment of a board of engineer and ordnance officers to determine on the proportionate number of such guns in fortifications for flank-defense, and the whole number required on July 1, 1874.

6th. The relations it shall occupy to the different arms of service, and the number to be held in reserve for that purpose, should be settled by competent authority.

By order of the Chief of Ordnance.

S. V. BENÉT, *Major of Ordnance.*

Respectfully referred to the Chief of Engineers for remarks.

By order of the Secretary of War.

H. T. CROSBY, *Chief Clerk.*

JANUARY 22, 1874.

OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 23, 1874.

Respectfully referred to the board of engineers for fortifications for report.

By command of—
Brig. Gen. HUMPHREYS.

THOMAS LINCOLN CASEY,
Major of Engineers.

OFFICE BOARD OF ENGINEERS FOR FORTIFICATIONS,
New York, February 3, 1874.

Respectfully returned to the Chief of Engineers, with report of board of this date.

J. G. BARNARD,
Col. of Eng. and Brt. Maj. Gen.,
Prest. Board of Eng. for Fortifications.

OFFICE OF BOARD OF ENGINEERS FOR FORTIFICATIONS,
Army Building, New York, February 3, 1874.

GENERAL: The board of engineers for fortifications, having examined the report referred to them by your indorsement of January 23, 1874, of a special board of officers upon the introduction of the Gatling gun for flank-defense in fortifications, have the honor to submit the following views thereon. The experimental firings with the Gatling gun, compared with those of the 8-inch howitzer and 24-pounder Napoleon, are clearly set forth and fully discussed by the officers conducting these firings, and this

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board concur generally in their deductions and conclusions. While a good flank-defense of most of our forts may not require the introduction of the Gatling gun, its use as an auxiliary in special cases may be desirable.

The fire of canister, 440 bullets at once, has the effect of a volley, and the first discharge may completely break an assaulting column. This volley effect of the howitzer is in part made up by the continuity of fire of the Gatling, and the combination of the two, the latter filling up the intervals between the volleys, would seem to be superior to either singly, unless the number of howitzers gives a rapidity of fire approaching continuity.

The Gatling requires fewer gunners for its service, and there are some small works where the garrisons may be quite limited on the breaking out of war, necessitating economy of men in the service of the pieces. These guns on the ramparts, in such works, would supply the place of a large number of soldiers. In many of our works the strength is superabundant, and either system of flank-defense will doubtless be sufficient. Before determining to what extent the Gatling may be introduced as an auxiliary, it will be necessary to take up our permanent works *seriatim*, and discuss the probabilities and nature of the attack, and decide therefrom if any change in the flank-guns will be required. From their position and strength many forts will need no change. In the more exposed works, especially in the cases noted by the board, the Gatling will doubtless aid flank-defense.

2d. This board give it as their opinion that a number of Gatling guns may be effectually used on the parapet of works, as being more accurate in their fire at a distance upon reconnoitering parties, both by land and water, than field-artillery, or pieces in position, or even musketry, and they can be served with less exposure. Many of the barbette-batteries that have been recommended by this board are isolated and unsupported by permanent works. Some small keeps will probably be built to protect them The Gatling gun will be found very efficient in these keeps to clear the advanced batteries if attacked by boat or shore parties with a view to spiking the guns, and will sweep the approaches to such batteries. Further, the Gatling gun will prove very serviceable in firing into the embrasures of iron-clad ships that approach within 1,000 or 1,200 yards of a fort. For these various purposes it will be perceived that each fort may use judiciously a number of Gatling guns, and their utility may be further developed when once introduced into service. The study of each fortified position should be made before determining, even in a general manner, the number of such guns needed.

Though concurring generally in the deductions of the special board as to the utility of the Gatling gun in many positions, a thorough discussion of our forts may show, as before stated, that only a limited portion of them will need the auxiliary assistance of the Gatling gun for an efficient flank-defense. Its efficiency in field-works, not only for flank but for direct fire, seems unquestionable.

The report of the board on Gatling guns, with letter of transmittal, is herewith returned, (in separate package by mail.)

Respectfully submitted.

J. G. BARNARD,
Col. of Eng. and Bvt. Maj. Gen.
Z. B. TOWER,
Lieut. Col. of Eng. and Bvt. Maj. Gen.
H. G. WRIGHT,
Lieut. Col. of Eng. and Bvt. Maj. Gen.

Brig. Gen. A. A. HUMPHREYS,
Chief of Engineers, U. S. A., Washington, D. C.

Fifth indorsement.

OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 6, 1874.

Respectfully returned to the War Department, with report of the board of engineers for fortifications upon the matter of the use of Gatling guns, and report of board on Gatling guns. The views and suggestions contained in the report of the board of engineers are approved.

A. A. HUMPHREYS,
Brig. Gen. and Chief of Engineers.

The recommendations of the Chief of Ordnance are approved.
By order of the Secretary of War:

H. T. CROSBY, *Chief Clerk.*

FEBRUARY 11, 1874.

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WAR DEPARTMENT,
March 16, 1874.

The Secretary of War has the honor to transmit to the United States Senate and House of Representatives the accompanying letter of the Acting Chief of Ordnance, dated the 13th instant, relative to the adoption of the Gatling gun as an auxiliary arm of defense, and recommending an appropriation of $292,600 to provide two hundred and nine of these guns and carriages, for fortifications, in the interests of the national defense.

WM. W. BELKNAP,
Secretary of War.

ORDNANCE-OFFICE, WAR DEPARTMENT,
Washington, March 13, 1874.

SIR: I have the honor to report that, in pursuance of the appropriation "for experiments and tests of two Gatling guns of large caliber for flank-defense for fortifications," which was made by the "act making appropriations for the support of the Army for the year ending June 30, 1874," approved March 3, 1873, a board of officers, of which Maj. Q. A. Gillmore, Engineer Corps, was president, was convened by Special Orders No. 108, Adjutant-General's Office, 1873, to meet on the 5th of June, 1873, to decide upon the caliber of guns to be tried and the ammunition to be used in the experiments and tests contemplated. The board duly met at the time appointed, and, after thorough and exhaustive trials at Fort Monroe, Va., of the Gatling guns, with several varieties of ammunition, in comparison with the 12-pounder field-gun, 4½-inch rifle, and 8-inch siege-howitzer, using spherical case, canister, and shrapnel, of regular and special construction, and also in comparison with a detachment of 40 men armed with Springfield breech-loading rifles, submitted their report to this Bureau on the 16th ultimo, giving the details of their labors, and concluding with their views and recommendations on the general subject. These views and recommendations, with the indorsement of this Office, are as follows:

"1. Among the advantages possessed by the Gatling gun may be enumerated the lightness of its parts; the simplicity and strength of its mechanism; the rapidity and continuity of its fire without sensible recoil; its effectiveness against troops at all ranges for which a flanking-gun is required; its general accuracy at all ranges attainable by rifles; its comparative independence of the excitement of battles; the interchangeableness of its ammunition with the same caliber of small-arms, and its great endurance.

"2. Its disadvantages, compared with howitzer and other shell-guns, are, its inability to deliver a curved fire so as to reach an enemy behind intervening obstacles, or to search his rifle-pits and covered ways; its want of effectiveness against troops covered by even the slightest entrenchments, or lodged in villages and houses, or in heavy woods, and generally its entire deficiency in breaching power.

"3. In permanent fortifications, where the lines of defense do not exceed 200 yards—and therefore very generally in our permanent works—nothing would be gained by using the Gatling .42-inch gun for flanking purposes instead of the 8-inch howitzer, firing the special canister devised by the board. In special cases, where the flanking-guns can fire over the counterscarp and command the approaches for a considerable distance, the Gatling gun, being good at both long and short ranges, could be advantageously introduced as an auxiliary.

"4. For the defense of detached field-fortifications, placed in defensive relations to each other, and entrenched positions with long lines of defense, the Gatling gun would be superior to any other species of artillery against troops exposed to view, and therefore a most valuable auxiliary to shell-guns.

"5. One advantage possessed by the Gatling gun is its lightness, and hence the ease with which it can be withdrawn from position when exposed to breaching-batteries or any overpowering or disabling fire, and replaced in battery to meet the critical moment of an assault.

"6. The board recommend the adoption of the Gatling gun as an auxiliary arm for flanking purposes, but not to any very considerable displacement of shell-guns in any locality or under any circumstances. The caliber of the Gatling gun adopted should be the same as that of the service small-arm, so that the ammunition will be interchangeable between the two.

"7. The 1-inch caliber Gatling gun possesses no special advantages for flanking purposes. In rapidity of fire it is greatly inferior to the smaller calibers, and this inferiority is not compensated by the greater weight and longer range of the 1-inch solid shot, while the 1-inch canister projectiles, whether filled with spherical balls or cylindrical slugs, cannot, with the penetrations obtained by the board, be considered an effective missile against troops at 150 to 200 yards, while beyond 200 yards it would be comparatively harmless. With quicker powder it would doubtless give better results.

"8. The service-canister for the 8-inch siege-howitzer is manifestly very much inferior

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to the special canister issued by the board. This remark, of course, applies equally to other calibers. It is, therefore, recommended that the use of round cast-iron balls for canister be discontinued, and that lead balls, not lighter than 11 to the pound, be substituted therefor. Balls 8 to the pound would perhaps be still better. But for the use of this special canister, the .42-inch Gatling gun would in all cases have given the best results in the competitive trials had before the board.

"9. Although the board is not prepared to state to what precise extent the Gatling gun should be introduced into that portion of the armament of fortifications intended, either specially or contingently, to be used for flanking purposes, the proportion of one Gatling gun for one shell-gun is suggested. It is believed the number of Gatlings ought not to exceed the number of shell-guns.

"10. It is further suggested that the Gatling Gun Company be requested to devise and manufacture for trial two casemate-carriages for their .45-inch gun, to be placed side by side in one casement, the carriages to be so arranged, if practicable, that the centers of motion for elevating and depressing the piece, as well as for changes in the direction of fire, shall be at the throat of the embrasure; also, that the company be requested to devise an improvement in the oscillator, as suggested in the remarks under the head of 'Results at 1,200 yards.'

"11. The board have necessarily limited the scope of their recommendations to the restricted field of inquiry contemplated in the order, and have, therefore, not touched upon the most prominent advantages claimed and generally conceded for the Gatling gun. Among these may be enumerated its peculiar power for the defense of intrenched positions and villages; for protecting roads, defiles, and bridges; for covering the embarkation or debarkation of troops or the crossing of streams; for silencing field-batteries or batteries of position; for increasing the infantry fire at the critical moment of a battle; for supporting field-batteries, and protecting them against cavalry or infantry charges; for covering the retreat of a repulsed column; and, generally, the accuracy, continuity, and intensity of its fire, and its economy in men for serving and animals for transporting it.

"It is suggested that the relations which this gun shall occupy to the different arms of service should be prescribed by competent authority.

"Respectfully submitted.

"Q. A. GILLMORE,
"*Maj. Engineers, Bvt. Maj. Gen.*
"T. J. TREADWELL,
"*Maj. Ordnance.*
"L. LORAIN,
"*Capt. Third Artillery.*

"NEW YORK, *January* 16, 1874."

ORDNANCE-OFFICE, *January* 21, 1874.

"The foregoing report is respectfully submitted to the Secretary of War, with the following recommendations:

"1st. The adoption of the Gatling gun, caliber .45, using the service-cartridge, as an auxiliary arm for flank-defense of fortifications.

"2d. The adoption of a special canister for 8-inch flank-defense howitzer; to contain lead balls.

"3d. The designing and manufacturing of two casemate-carriages for the Gatling gun, as suggested by the board.

"4th. The adoption of the Gatling gun, caliber .45, as an auxiliary arm for all branches of the service.

"5th. The appointment of a board of engineer and ordnance officers to determine on the proportionate number of such guns in fortifications for flank-defense and the whole number required on the 1st of July, 1874.

"6th. The relation it shall occupy to the different arms of service, and the number to be held in reserve for that purpose should be settled by competent authority.

"By order of the Chief of Ordnance.

"S. V. BENÉT,
"*Major of Ordnance.*"

The report and recommendations of the board being thereupon referred to the Chief of Engineers for report, that officer referred it to the board of engineers for fortifications, then in session in New York. That board returned the papers, with the following report:

"OFFICE OF BOARD OF ENGINEERS FOR FORTIFICATIONS,
"*Army Building, New York, February* 3, 1874.

"GENERAL: The board of engineers for fortifications having examined the report referred to them, by your indorsement of January 23, 1874, of a special board of officers upon the introduction of the Gatling gun for flank-defense in fortifications, have

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the honor to submit the following views thereon. The experimental firings with the Gatling gun, compared with those of the 8-inch howitzer and 24-pounder Napoleon, are clearly set forth and fully discussed by the officers conducting these firings, and this board concur generally in their deductions and conclusions.

"While a good flank-defense of most of our forts may not require the introduction of the Gatling gun, its use as an auxiliary in special cases may be desirable.

"The fire of canister, 440 bullets at once, has the effect of a volley, and the first discharge may completely break an assaulting column. This volley effect of the howitzer is in part made up by the continuity of fire of the Gatling; and the combination of the two, the latter filling up the intervals between the volleys, would seem to be superior to either singly, unless the number of howitzers gives a rapidity of fire approaching continuity.

"The Gatling requires fewer gunners for its service, and there are some small works where the garrisons may be quite limited on the breaking out of war, necessitating economy of men in the service of the pieces. These guns on the ramparts, in such works, would supply the place of a large number of soldiers. In many of our works the strength is superabundant, and either system of flank-defense will doubtless be sufficient. Before determining to what extent the Gatling may be introduced as an auxiliary, it will be necessary to take up our permanent works *seriatim*, and discuss the probabilities and nature of the attack, and decide therefrom if any change in the flank guns will be required. From their position and strength, many forts will need no change. In the more exposed works, especially in the cases noted by the board, the Gatling will doubtless aid flank-defense.

"2d. This board give it as their opinion that a number of Gatling guns may be effectually used on the parapet of works, as being more accurate in their fire at a distance upon reconnoitering parties, both by land and water, than field-artillery, or pieces in position, or even musketry, and they can be served with less exposure. Many of the barbette-batteries that have been recommended by this board are isolated and unsupported by permanent works. Some small keeps will probably be built to protect them. The Gatling gun will be found very efficient in these keeps to clear the advance batteries if attacked by boat or shore parties with a view to spiking the guns, and will sweep the approaches to such batteries. Further, the Gatling gun will prove very serviceable in firing into the embrasures of iron-clad ships that approach within 1,000 or 1,200 yards of a fort. For these various purposes, it will be perceived that each fort may use judiciously a number of Gatling guns, and their utility may be further developed when once introduced into service. The study of each fortified position should be made before determining, even in a general manner, the number of such guns needed.

"Though concurring generally in the deductions of the special board as to the utility of the Gatling gun in many positions, a thorough discussion of our forts may show, as before stated, that only a limited portion of them will need the auxiliary assistance of the Gatling gun for an efficient flank-defense. Its efficiency in field-works, not only for flank but for direct fire, seems unquestionable.

"The report of the board on Gatling guns, with letter of transmittal, is herewith returned, (in separate package by mail.)

"Respectfully submitted.

"J. G. BARNARD,
"*Col. and Bvt. Maj. Gen.*
"Z. B. TOWER,
"*Lt. Col. of Engineers and Bvt. Maj. Gen.*
"H. G. WRIGHT,
"*Lt. Col. of Engineers and Bvt. Maj. Gen.*

"Brig. Gen. A. A. HUMPHREYS,
"*Chief of Engineers, U. S. A., Washington, D. C.*"

This report, being approved by the Chief of Engineers, was submitted to the Secretary of War on the 6th ultimo, and the following indorsement was made on the whole matter:

"The recommendations of the Chief of Ordnance are approved.
"By order of the Secretary of War:

"H. T. CROSBY,
"*Chief Clerk.*

"FEBRUARY 11, 1874."

In pursuance of the fifth recommendation of the Chief of Ordnance, a board of officers, of which Lt. Col. Z. B. Tower, Engineer Corps, was president, was appointed by Special Orders No. 36, A. G. O., 1874, whose reporr is herewith submitted as follows:

"ARMY BUILDING,
"*New York, February* 26, 1874.

"SIR: The board of officers appointed by Special Orders No. 36, par. 10, War Depart

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ment, A. G. O., February 17, 1874, to determine on the proportionate number of Gatling guns in fortifications for flank defense, and the whole number required on the 1st day of July, 1874, met in this city as per record of proceedings herewith inclosed. Having carefully considered the subject referred to them, they have the honor to submit the following report:

"'The record of trials at Fort Monroe with the 8-inch howitzer and the .42-inch Gatling prove their great efficiency for flank-defense. Either of these guns gives a much greater volume of fire than the old carronade or newer 24-pounder flank-gun, relied upon for arming the flank-casemates of our works at the time they were planned. But a small number of our lake and sea-coast forts may be regarded as liable to siege; and if fully garrisoned, and armed with either the 8-inch howitzer or the Gatling .45-inch gun, those with masonry-scarps would possess superabundance of strength to resist a *coup de main*. Yet many of these forts may at times be left with small garrisons; their flank armaments, therefore, should be the best possible. There can be no question that the great volume of fire of the 8-inch howitzer (1,173 balls discharged in one minute, or, if necessary, double that number) would prove irresistible on the short lines of defense of our permanent fortifications. Besides, these guns admit the use of shells when needed. But in this connection comes up the question, which is not a new one, as to the possibility of serving flank-guns with canister charges from opposite casemates at the same time, through all the horizontal angles of fire from the curtain to the counterscarp; and this question becomes the more pertinent now that the 24-pounder is to be replaced by an 8-inch caliber, throwing nine times the number of balls at one discharge, with greatly increased scattering power. Though this howitzer may be freely used to sweep the covered ways, and can probably fire along the middle of the ditches without much risk to the gunners in the opposite casemates, still, even with the aid of shutters, mantelets, or other arrangements that may be devised as protection to the men serving the pieces, in the event of simultaneous attacks along the curtain and the faces of adjacent bastions, it would be impossible to serve the opposite howitzers with the freedom that a good defense would require. The Gatling does not necessarily scatter at all, and can therefore be used with entire freedom to flank the bastions. It may be used also to flank the curtain, care being taken to direct it above or below the opposite embrasure. Moreover, as the Gatling does not recoil in firing, an iron or steel disk may be arranged around the barrel, near the throat of the embrasure, to give almost absolute protection to the gunners serving it as against fire from the opposite flank, or from hostile marksmen on the glacis. Many of our forts have high scarps and small tower bastions, with one, two, or three tiers of casemate embrasures, the lower tier in some cases raised but 3 or 4 feet above the ground, and therefore very accessible. An attempt to surprise such works would doubtless be made through the embrasures at many points. A Gatling gun placed in the casemate next to the curtain could deliver a continuous fire along the line of these embrasures, and would therefore be the most effective defense against such attack. For the reasons thus set forth, the board, regarding the Gatling gun (independently of its general merits) as a very necessary aid for flank casemate defense, have decided to recommend one for each flank of our casemated forts, even to the displacement of the howitzer, where there is but one flank embrasure, if the scarp can be readily approached, and if there be a line of embrasures raised but a few feet above the ground, as is the case with Fort Trumbull. In forts having wet ditches almost impassable, with but one embrasure in each flank, it is not necessary to use the Gatling in place of the howitzer, which will be very effective in sweeping the covered way, and can be served as a shell-gun. Where there are four embrasures in a flank, the board have decided to recommend two Gatling guns. The introduction of the Gatling into counterscarp casemates is not deemed necessary, as these casemates admit the aid of musketry-fire, and are generally so arranged that one set of flanking-guns is not exposed to the fire of any other. The board, in accordance with the foregoing views, examined the plans of our lake and sea-coast fortifications, and determined the number of Gatling guns required for each, as set forth in the annexed list.

"It will be seen that this list gives a total of two hundred and twenty-one Gatling guns, places for two hundred and nine of which will be ready July 1, 1874.

"Respectfully submitted.

"'Z. B. TOWER,
"'*Col. of Eng. and Brt. Maj. Gen.*
"'H. G. WRIGHT,
"'*Lieut. Col. of Eng. and Brt. Maj. Gen.*
"'T. J. TREADWELL,
"'*Maj. Ordnance, Brt. Lieut. Col.*

"'The ACTING CHIEF OF ORDNANCE,
"'*Washington, D. C.*'"

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List of forts for which the Gatling gun is recommended as an auxiliary to the howitzer for flank-defense, giving the number for each work, and the number of casemates originally designed to receive flank-howitzers.

Forts.	Number of casemates originally designed to receive flank-howitzers.	Number of Gatling guns recommended.
Wayne	23	8
Niagara	8	2
Ontario	6	2
Montgomery	40	10
Knox	20	4
Popham	4	2
Scammel	4	4
Warren	23	12
Winthrop		*4
Independence	20	10
Clark's Point	4	2
Adams	64	10
Trumbull	9	6
Schuyler	73	22
Hamilton	14	2
Tompkins	12	2
Wadsworth	24	8
Delaware	20	10
Monroe	15	6
Moultrie	4	*4
Pulaski	4	2
Clinch	20	10
Taylor	36	8
Jefferson	71	†24
Pickens	28	12
Barrancas and redoubt	16	‡2
Morgan	25	10
Gaines	20	10
Ship Island	2	2
Pike	4	2
Macomb	4	2
Saint Philip		*2
Jackson	10	*5
Total	627	221

* On rampart. † Ready for 12 only. ‡ In redoubt.

"ORDNANCE-OFFICE, *March* 5, 1874.

"Respectfully submitted to the Secretary of War, with the recommendation that the report of the board, of which Col. Z. B. Tower, Corps of Engineers, is president, be approved.

"S. V. BENÉT, *Acting Chief of Ordnance.*

"Approved:

"WM. W. BELKNAP, *Secretary of War.*

"MARCH 5, 1874."

This most careful and exhaustive investigation and trial of the Gatling gun has resulted in its adoption as an auxiliary arm, not only for the flank-defense of fortifications, but for all branches of the service.

Places in the fortifications for two hundred and nine of these guns will be ready on July 1, 1874.

It is, therefore, respectfully recommended that this communication be submitted to Congress, and an appropriation of $292,600 be asked for to provide two hundred and nine Gatling guns and carriages for the fortifications, in the interest of the national defense.

Very respectfully, your obedient servant,

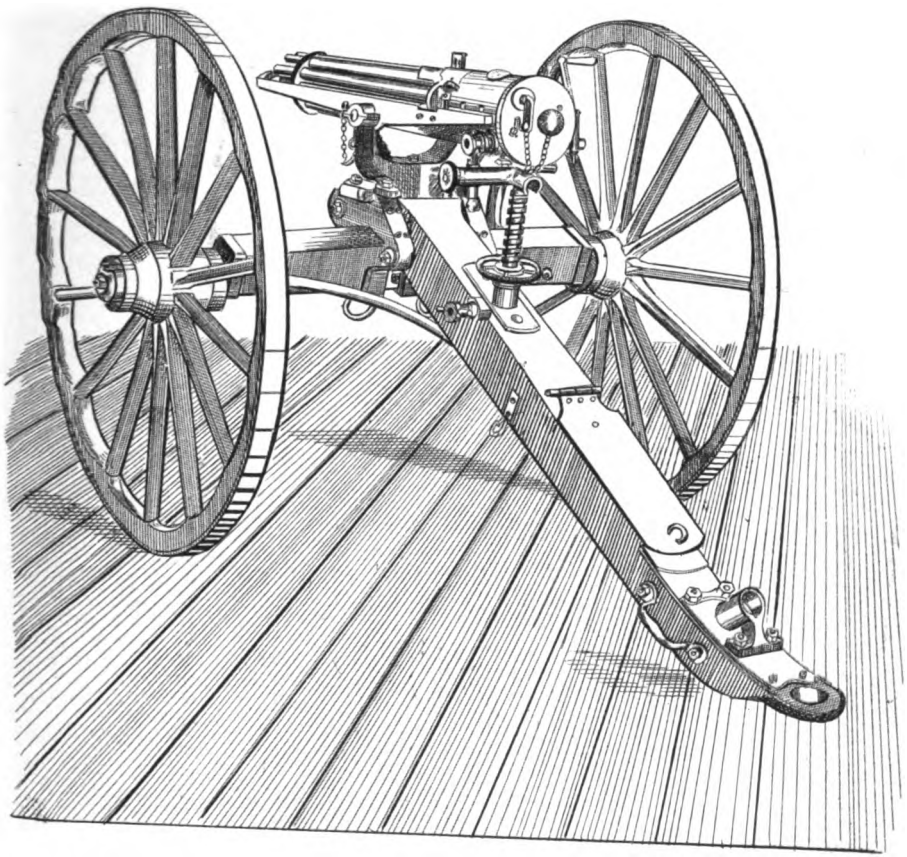
S. V. BENÉT,
Acting Chief of Ordnance.

The Hon. SECRETARY OF WAR.

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Fig. 1.



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GATLING GUN, CALIBRE 0.42 INCH

DEVELOPEMENT OF THE SPIRAL CAM AND FIRING MECHANISM

SHOWING ALSO THE ACTION OF THE LOCKS RELATIVELY TO THE BARRELS.

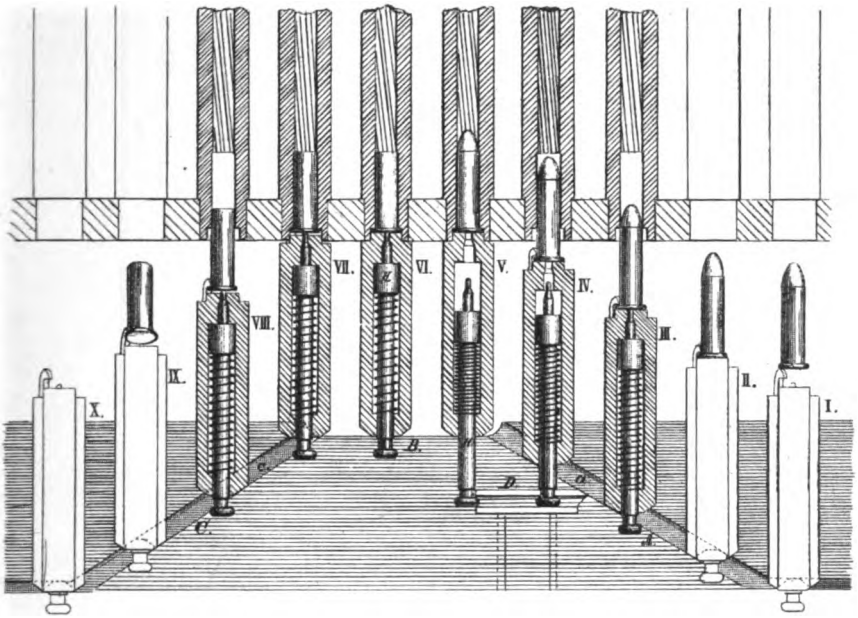


Fig. 2.

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Fig. 3.

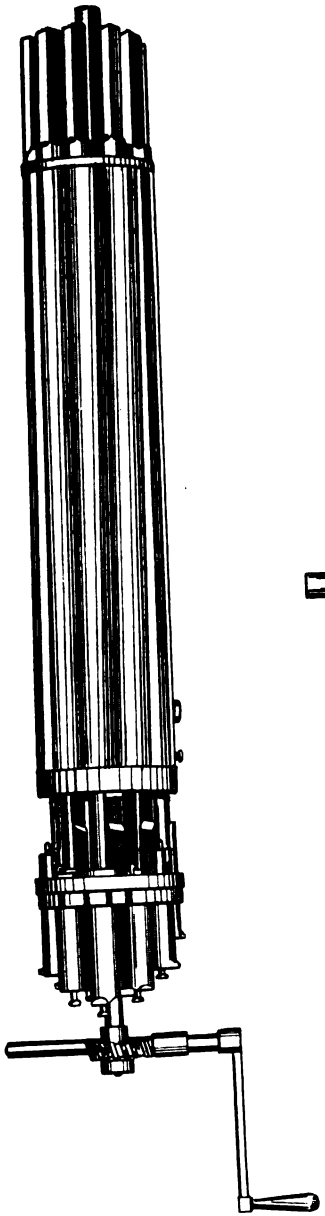
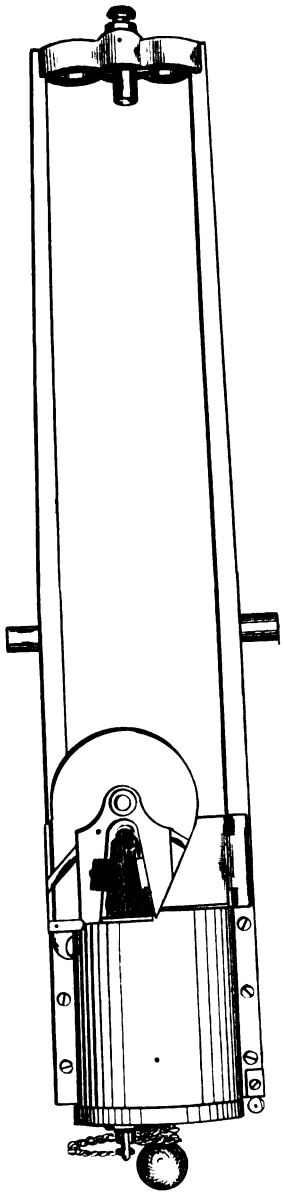


Fig. 4.



M. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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Fig. 5.

FEED-CASE FOR .45 INCH GATLING GUN.

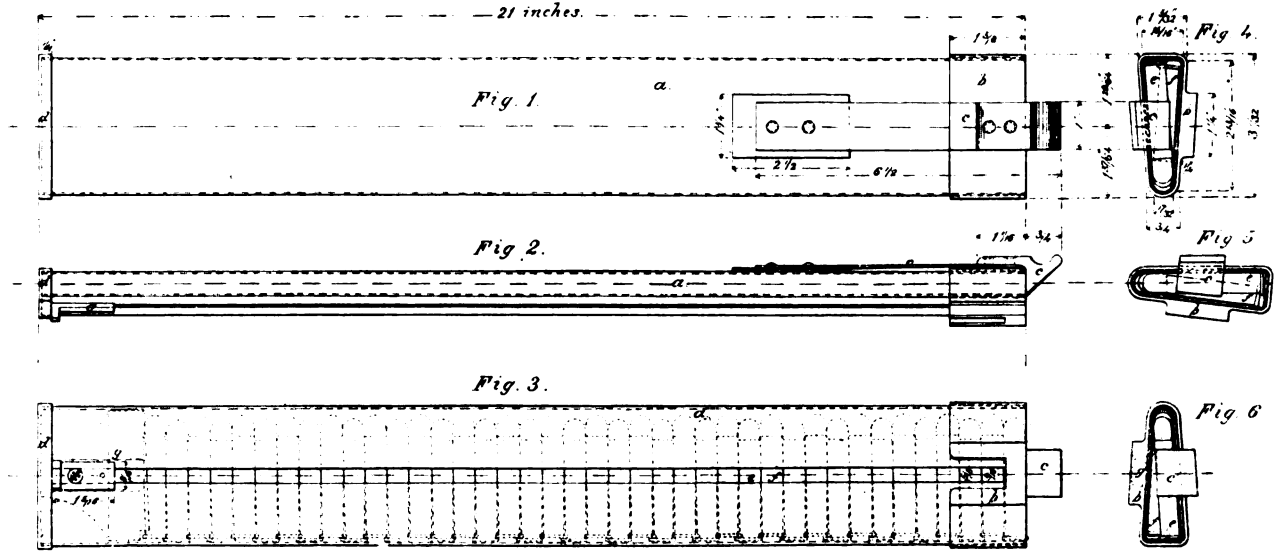


Fig. 1, Side-view, right
Fig. 2, Front-view.
Fig. 3, Side-view, left.
Figs. 4, 5, 6, Bottom-view.

a, Tin case
b, Bottom band
c, Spring catch.
d, Top cap.
e & f, 40 cartridges
g, Weight.

H. PETERS, PHOTO LITHOGRAPHER, WASHINGTON D.C.

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AMMUNITION USED

WITH THE GATLING 1 INCH & 0.42 INCH CALIBRES.

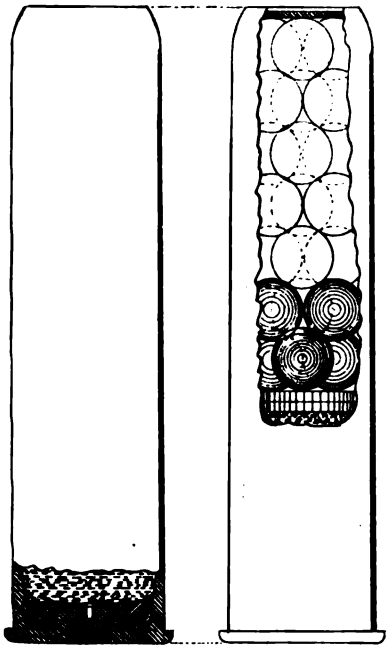


FIG. 7.

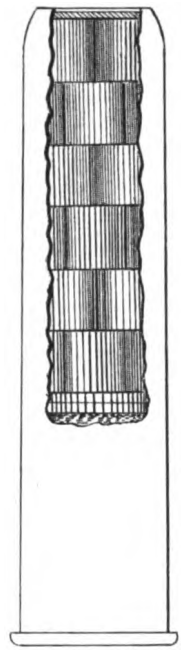


FIG. 8.

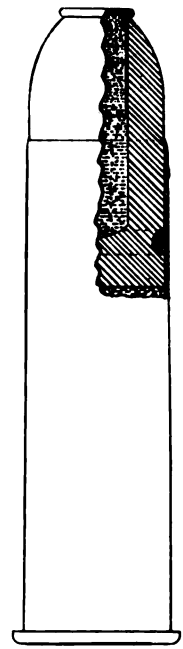


FIG. 9.

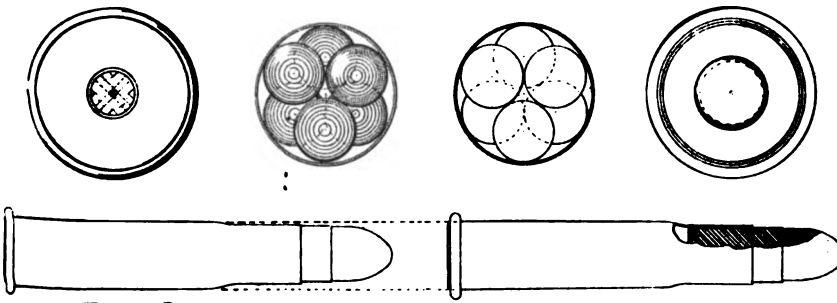


FIG. 6.

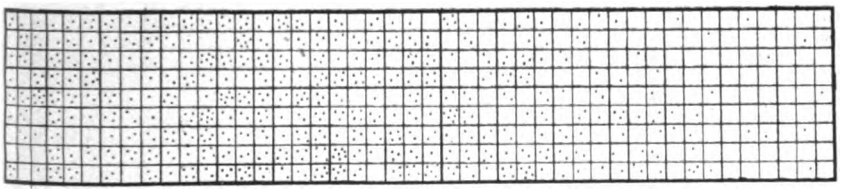
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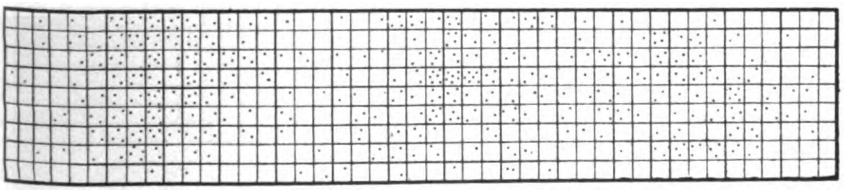
TRIAL No. 1.

12 pdr. Napoleon gun of 4.62 in. calibre.
Distance, 150 yds.
Target, canvas 9 feet by 45 feet.
Projectile, double canister; each canister containing 121 lead balls of 0.751 in. diam. and 0.091 lbs. in weight.
Total weight of one canister 14.5 lbs.
Charge, 2 lbs.
Elevation, 0.°30'.
No. of rounds fired, 6, in 1.'34".
No. of balls fired, 1452.
No of hits 601.
— This projectile was special canister prepared for these trials.



TRIAL No. 2.

Forty men with Springfield Rifles.
Distance, 200 yds.
Target, canvas 9 feet by 45 feet.
Firing service ammunition
No. of rounds fired, 614.
No. of hits, 428.
Time, 1.'30".
Wind brisk from left to right.



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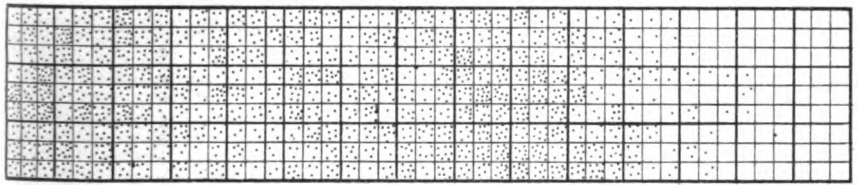
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TRIAL No. 3.

Gatling 10 barrel gun of 1.00 in. cal.

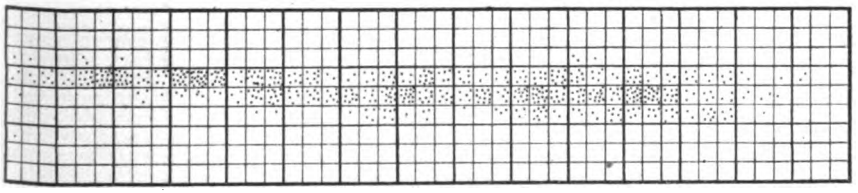
Distance, 150 yds.
Canvas target, 9 ft. by 45 ft.
Firing canister with 21 round lead balls from upright feed cases.
Weight of each projectile, 4922 grains.
Weight of each ball, 144 grains.
Time, 1'29".5.
No. of canister fired, 255 = 5355 balls.
No. of hits, 1595.



TRIAL No. 4.

Gatling 10 barrel gun of 0.42 in. cal.

Distance, 150 yds.
Canvas target, 9 ft. by 45 ft.
Firing single solid shot with upright cases.
Time, 1'29".5.
No. of shots fired, 605.
No. of hits, 594.



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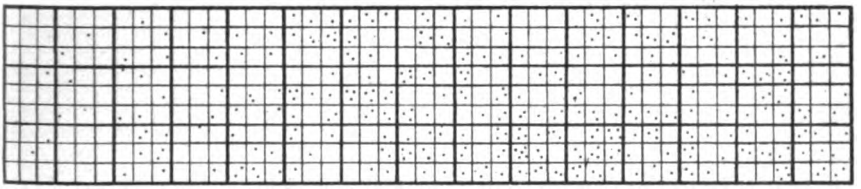
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TRIAL No. 5.

8 in. Siege Howitzer.

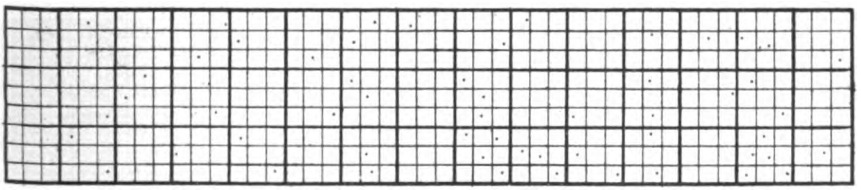
Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing single special canister containing 208 lead balls of 0.977 in. diam. and 0.2 lbs. in weight. Total weight of one canister 54 lbs.
Charge, 4 lbs.
Elevation, 1.°
Four rounds fired, in 2.'1."5
Hits, 312.
Wind dead ahead 18 to 20 miles per hr.
— The excess in time of firing in this trial over the succeeding ones is due to waiting for the command to fire which was omitted in the latter.



TRIAL No. 6.

8 in. Siege Howitzer.

Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing single service canister containing 48 iron balls of 1.85 in. dia. and 0.86 lbs. in weight. Total weight of one canister 53.5 lbs.
Charge, 4 lbs.
Elevation, 1.°
Four rounds fired in 1.'32."5.
Hits, 52.
Wind dead ahead 18 to 20 miles per hr.



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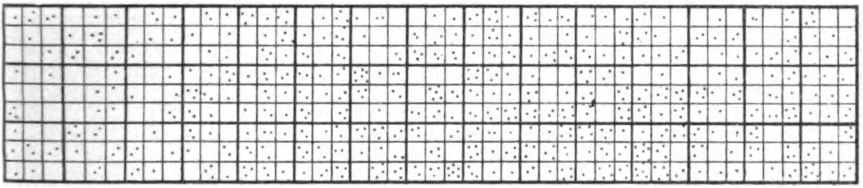
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TRIAL No. 7.

8 in. Siege Howitzer.

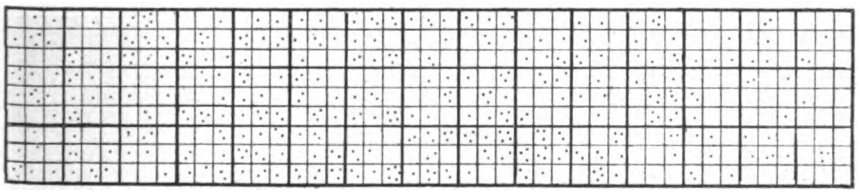
Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing single special canister containing 440 lead balls of 0.75 in. diam. and 0.091 lbs. in weight. Total weight of canister 54 lbs.
Charge, 4 lbs.
Elevation, 1°30'.
Four rounds fired, in 1'26".5.
No. of hits, 570.
Wind dead ahead 10 to 12 miles per hr.



TRIAL No. 8.

12 pdr. Napoleon gun of 4.62 in. cal.

Distance, 200 yds
Canvas target, 9 ft. by 45 ft.
Firing double canister, each containing 121 lead balls of 0.751 in. diam. and 0.091 lbs. in weight. Total weight of one canister 14.5 lbs.
Charge, 2 lbs.
Elevation, 1°45'.
Six rounds fired, in 1'35".
No. of balls fired = 2 × 6 × 121 = 1452.
No. of hits, 379.
— This projectile was special canister prepared for these trials.



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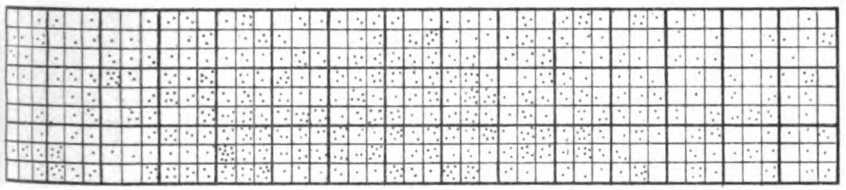
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TRIAL No. 9.

8 in. Siege Howitzer.

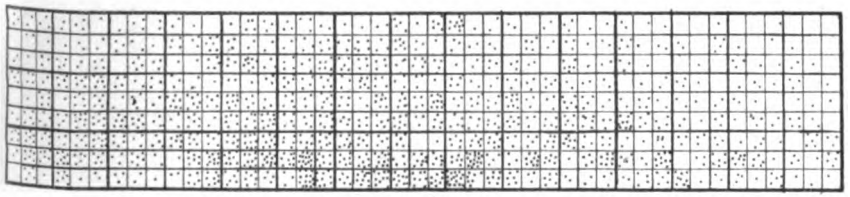
Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing double special canister; each canister containing 440 lead balls of 0751 in. diam. or 11 to the lb. Total weight of one canister 54 lbs.
Charge, 4 lbs.
Elevation, 1°30'.
Two rounds fired deliberately containing 2×2×440=1760 balls.
No. of hits, 718, counted after each round.
— The intention was to fire four rounds of double canister but the target was to much shattered to be used for more than two.



TRIAL No. 10.

8 in. Siege Howitzer.

Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing double special canister, each canister containing 440 lead balls of 0.751 in. diam. or 11 to the lb.
Elevation, 1°30'.
Four rounds fired deliberately.
No. of balls fired, 3520
No. of hits, 1463.
Wind brisk from left to right across line of fire.



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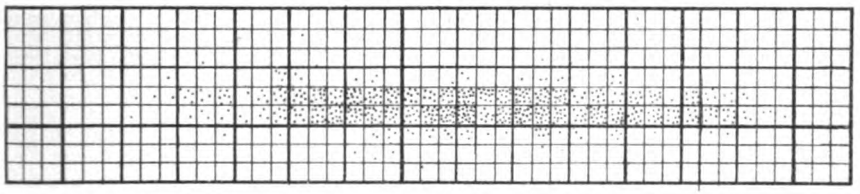
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TRIAL No. 11.

Gatling 10 barrel gun of 0.42 in. cal.

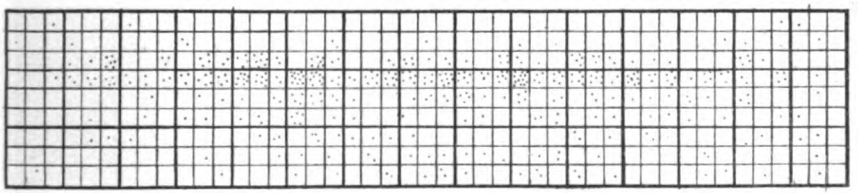
Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing single solid shot with feed drum.
Time, 1'29".5.
No. of shots fired, 637.
No. of hits, 618.
— One man turned the crank for first drum relieved by another for the second drum.
The time taken was the average time required to fire four rounds with the 8 in. howitzer as determined by trials 6 and 7.
Wind dead ahead 10 to 12 miles per hr.



TRIAL No. 12.

Gatling 10 barrel gun of 0.42 in. cal.

Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing two ball cartridges.
Time, 1'29".5.
No. of rounds fired, 272 = 544 balls.
No. of hits, 414.
— The projectile contained <u>one</u> pointed & <u>one</u> cylindrical ball.
The drum was used. — Man at crank relieved once.



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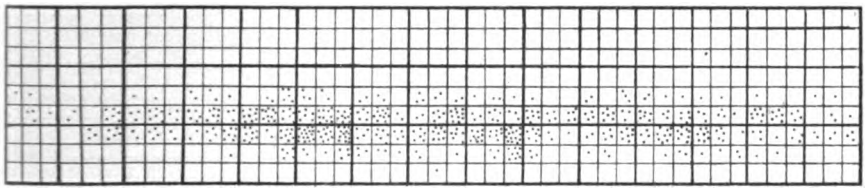
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TRIAL No. 13.

Gatling 10 barrel gun of 0.42 in. cal.

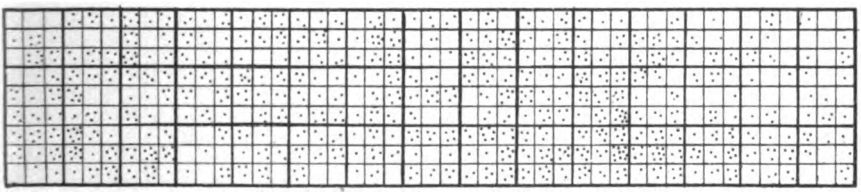
Distance, 200 yds.
Canvas target 9 ft. by 45 ft.
Firing single solid shot with upright cases.
Charge, 77 grains.
Time of firing, 1'29".5.
No. of shots fired, 550.
No. of hits, 530.



TRIAL No. 14.

Gatling 10 barrel gun of 1.00 in. cal.

Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing canister with 18 cylindrical slugs from upright feed cases.
Weight of projectile, 5543 grs., of slug 199 grs., length 0.45 in., diam. 0.45 in.
Elevation, 0°.30' ;
Time, 1'29".5.
Charge, 3/4 of an oz.
No. of canisters fired, 213 = to 3834 slugs.
No. of hits, 846.
— Man at crank relieved once during firing.



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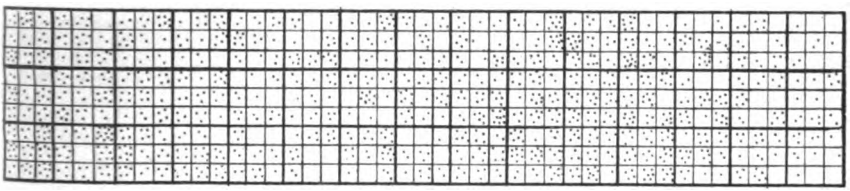
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TRIAL No. 15.

Gatling 10 barrel gun of 1.00 in. cal.

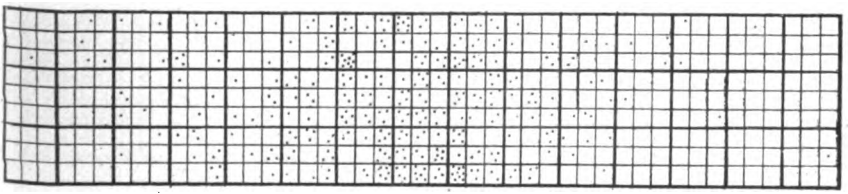
Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing canister with 21 round lead balls from upright feed cases.
Weight of projectile, 4.922 grains. Lead balls 0.45 in. diam. and 144 grains in weight.
Time, 1'.29".5.
Charge, 3/4 of an oz.
No. of canisters fired, 230 = 4830 balls.
No. of hits, 1172.



TRIAL No. 16.

Forty men with Springfield Rifles.

Distance, 200 yds.
Canvas target, 9ft. by 45 ft.
Firing service ammunition.
No. of rounds fired, 601.
No. of hits, 320.
Time, 1'.30".
Wind brisk from left to right.



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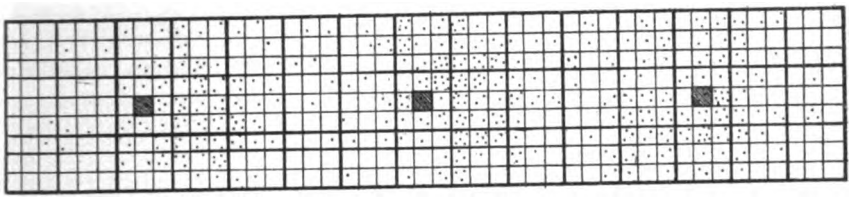
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TRIAL No. 17.

Forty men with Springfield Rifles.

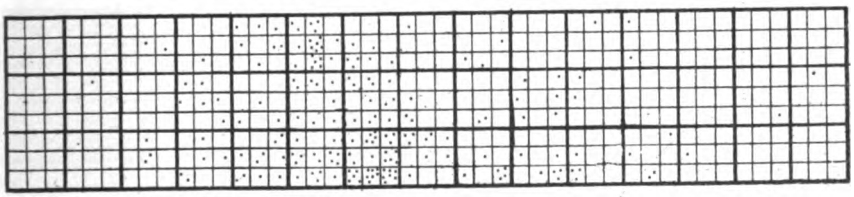
Distance, 200 yds.
Canvas target, 9 ft. by 45 ft.
Firing service ammunition deliberately.
No. of rounds fired, 600.
No. of hits, 436.
Time, 3'. 54 1/4".
Wind brisk from left to right.



TRIAL No. 18.

12 pdr. Napoleon gun of 4.62 in. cal.

Distance, 500 yds.
Canvas target., 9 ft. by 45 ft.
Firing spher. case. Each shell containing 82 lead balls of 0.69 in. dia. and 0.071 lbs. weight. Total weight of case shot (fixed) 14.7 lbs.
Charge, 2.5 lbs.
Elevation, 1°.15'.
Six rounds fired deliberately.
No. of balls fired, 492.
No. of hits, 184.
Bormann fuze cut to 1".5
— 1st, 2nd & 3rd rounds burst in 1".75 about 100 ft. in front. — 4th round did not explode (lost). — 5th round burst 15 ft. beyond target (lost). — 6th round burst in 1".5, 60 ft. in front.



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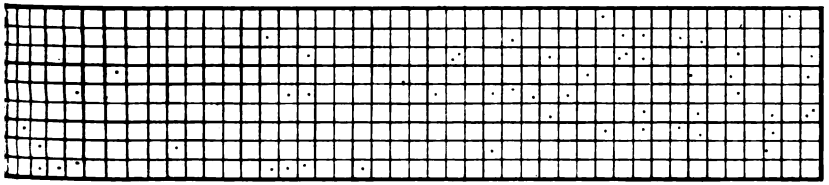
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TRIAL No. 19.

12 pdr. Napoleon gun of 4.62 in. cal.

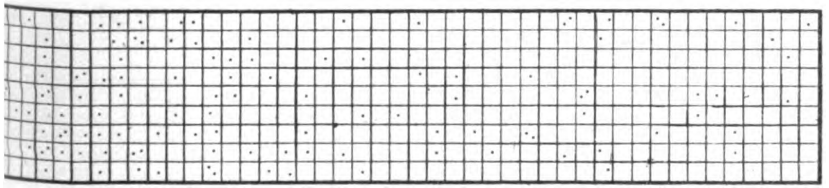
Distance, 500 yds.
Canvas target, 9 ft. by 45 ft.
Firing spherical case shot. Each shell containing 82 lead balls of 0.69 in. diam. & 0.071 lbs. weight. Total weight of one case shot (fixed) 14.7 lbs.
Charge, 2.5 lbs.
Elevation, 1°15'.
Seven rounds fired in 1'31".
No. of balls fired, 82 × 7 = 574.
No. of hits, 55.
Bormann fuze cut to 1".5.
1st round burst beyond target. — None were good line shots.



TRIAL No. 20.

8 in. Siege Howitzer.

Distance, 500 yds.
Canvas target, 9 ft. by 45 ft.
Firing spherical case shot. Each shell containing 486 lead balls of .0.69 in. diam. & 0.071 lbs. weight. Total weight of one case shot 59.5 lbs.
Charge, 4 lbs.
Four rounds fired deliberately.
Necessary time 1'26".5, as before determined.
No. of balls fired, 1944.
No. of hits, 112.
1st round, Elev. 2°, Fuse 1".75, burst 200 ft. short. 3rd. round, Elev. 3°, Fuse 2", burst 250 ft. short.
2nd " " 2°.30' " 2" " 200 " " 4th. " " 4° " 2".5 " 175 " "



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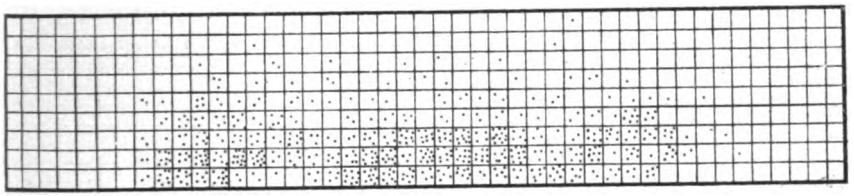
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TRIAL No. 21.

Gatling 10 barrel gun of 0.42 in. cal.

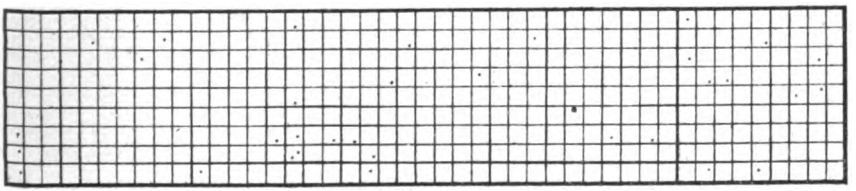
Distance, 500 yds.
Canvas target, 9 ft. by 45 ft.
Firing single solid shot in upright cases deliberately.
40 balls in each case.
No. of shots fired, 600.
No. of hits, 557.



TRIAL No. 23.

12 pdr. Napoleon gun of 4.62 in. cal.

Distance, 800 yds.
Canvas target, 9 ft. by 45 ft.
Firing spherical case shot.
Seven rounds fired in 1'.30".
Elevation, 2°
For three rounds the fuze was cut to 2"¼, and for the other four to 2".—Two did not burst, and three burst beyond target.
No. of hits, 35.



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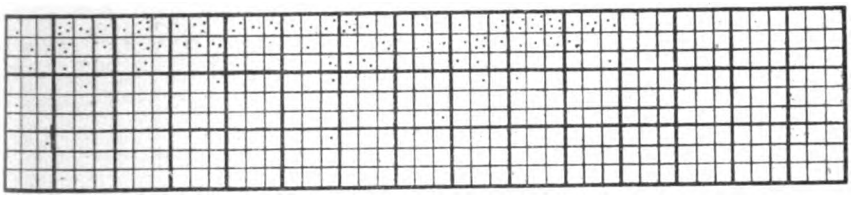
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TRIAL No. 25.

Gatling 10 barrel gun of 0.42 in. cal.

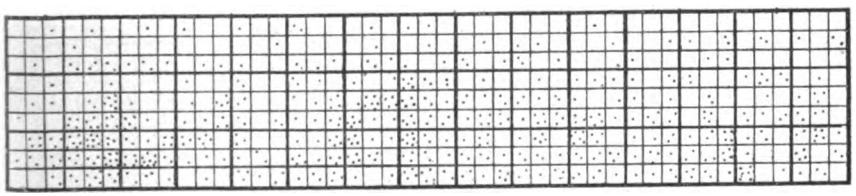
Distance, 800 yds.
Canvas target 9 ft. by 45 ft.
Firing single solid shot in upright cases deliberately.
40 balls in each case.
No trial shot made before firing
No. of shots fired, 600.
No. of hits, 106.
Strong 15 knot breeze across line of fire.



TRIAL No. 26.

Gatling 10 barrel gun of 0.42 in. cal.

Distance, 800 yds.
Canvas target, 9 ft. by 45 ft.
Firing single solid shot in upright cases.
40 balls in each case.
Forty trial rounds fired to get range.
No. of shots fired, 600.
No. of hits, 534.
Brisk breeze across line of fire.



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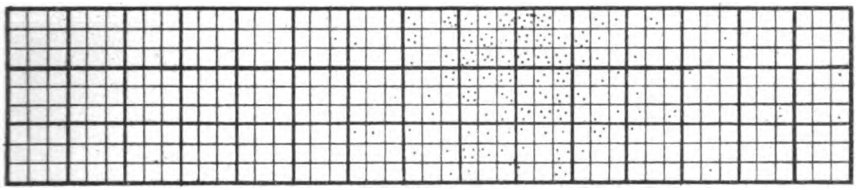
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TRIAL No. 27.

Gatling 10 barrel gun of 0.42 in. cal.

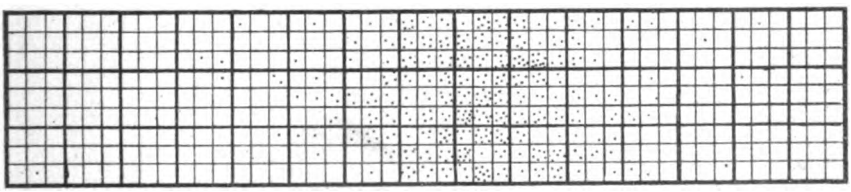
Distance, 1200 yds.
Canvas target, 9 ft. by 45 ft.
Firing single solid shot with upright cases.
Oscillator not used.
Gun aimed at centre of target.
No. of shots fired deliberately, 600.
No. of hits, 180.
Wind fresh from rear to front.



TRIAL No. 28.

Gatling 10 barrel gun of 0.42 in. cal.

Distance, 1200 yds.
Canvas target, 9 ft. by 45 ft.
Firing single solid shot with upright cases.
Oscillator not used.
Gun aimed at centre of target.
No. of shots fired deliberately, 600.
No. of hits, 413.
Wind fresh from rear to front



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TRIAL No. 29.

4½-in. rifled siege-gun.

Column of ten board targets, each 6 *feet by* 50 *feet, placed* 50 *feet apart, one behind the other.*

Material, inch yellow-pine boards.

Distance of 1*st or nearest target,* 1,000 *yds.*

Firing shrapnel; each containing 168 *lead balls of* 0.69 *in. cal.*

Total weight of projectile, 32 *lbs.*

Bursting charge, 3 *ozs.*

Schenkl's percussion fuse.

Four rounds fired deliberately.

Charge, 3 *lbs.*

Elevation, 2° 50′.

No. of balls fired, 672.

No. of hits, 334.

1*st round burst* 100 *feet in front of* 1*st target.*

Time of bursting, 3.75 *seconds.*

2*d round did not burst.*

3*d round burst in front of* 7*th target.*

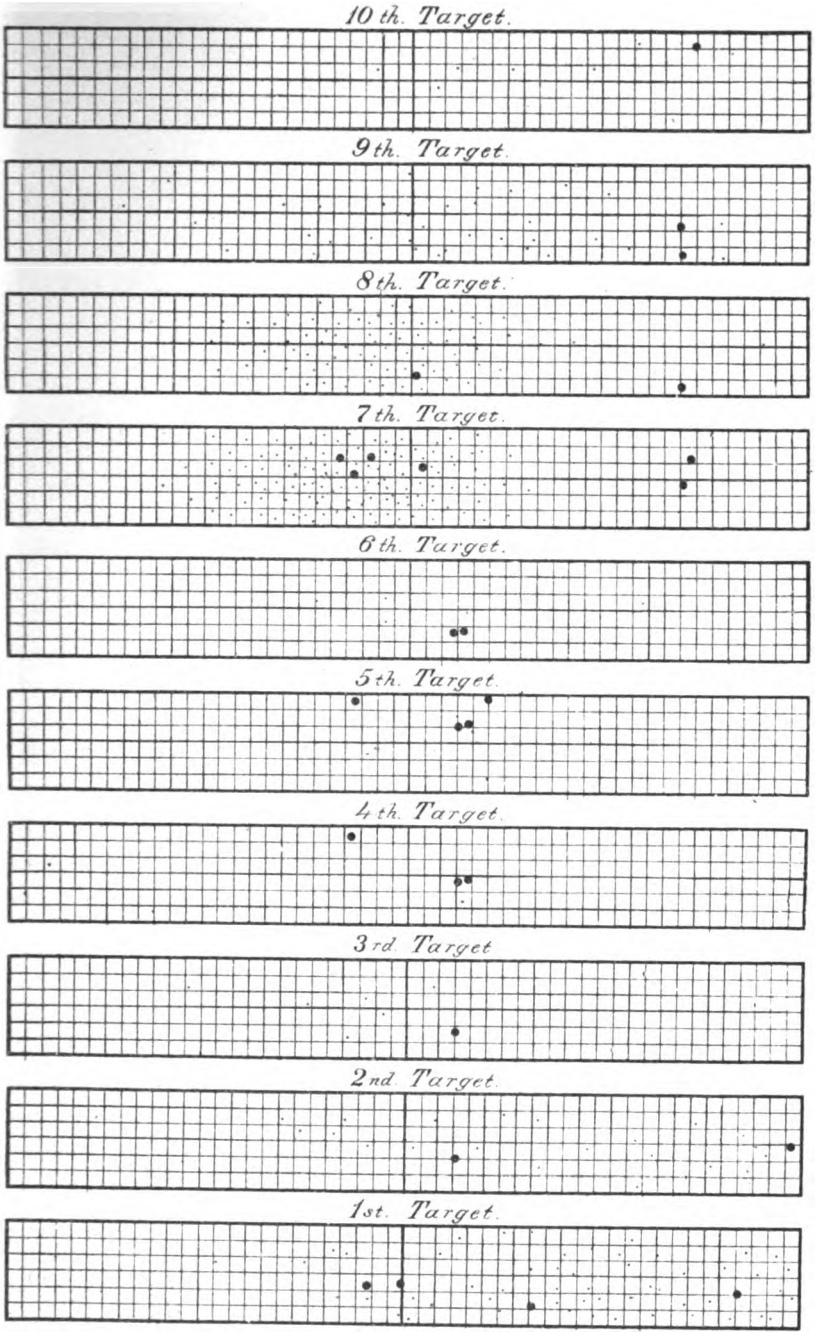
Time of bursting, 3.75 *seconds.*

4*th round burst above the column.*

Wind oblique to line of fire, from left to right and ahead, eight to ten miles per hour.

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TRIAL No. 30.

4½-in. rifled siege-gun.

Column of ten board targets, each 6 *feet by* 50 *feet, placed* 50 *feet apart, one behind the other.*

Material, inch yellow-pine boards.

Distance of 1*st or nearest target,* 1,000 *yds.*

Firing shrapnel; each containing 168 *lead balls of* 0.69 *in. cal.*

Total weight of projectile, 32 *lbs.*

Bursting charge, 3 *ozs.*

Schenkl's percussion fuse.

Four rounds fired deliberately.

Charge, 3 *lbs.*

Elevation, 2° 45′.

No. of balls fired, 672.

No. of hits, 164.

1*st round burst in front and to the right of* 1*st target.*

Time of bursting 3.3 *seconds.*

2*d round burst in front and to the right of* 1*st target.*

Time of bursting, 3 *seconds.*

3*d round burst in front and to the right of* 1*st target.*

Time of bursting, 3.15 *seconds.*

4*th round burst beyond* 1*st target.*

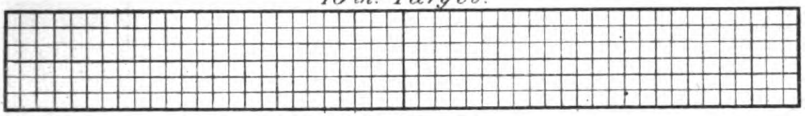
Time of bursting, 3.45 *seconds.*

Wind obliquely across line of fire, from left to right and ahead, eight to ten miles per hour, variable.

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TRIAL No. 30.

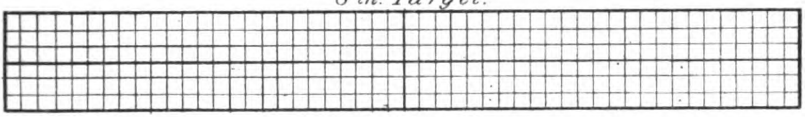
10th. Target.



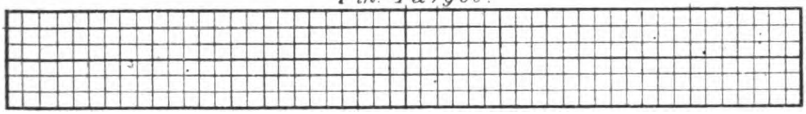
9th. Target.



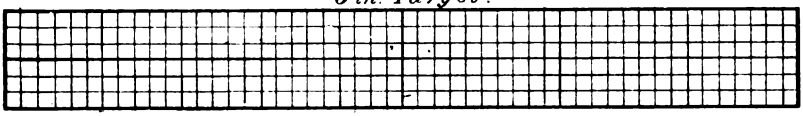
8th. Target.



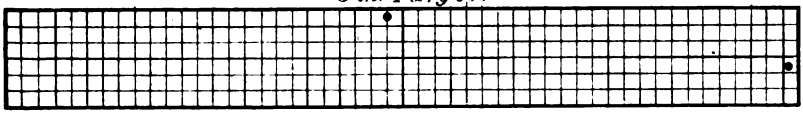
7th. Target.



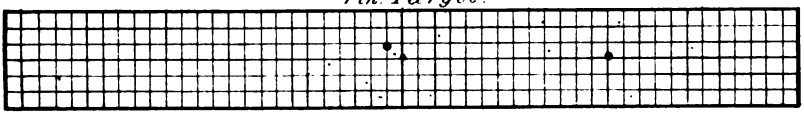
6th. Target.



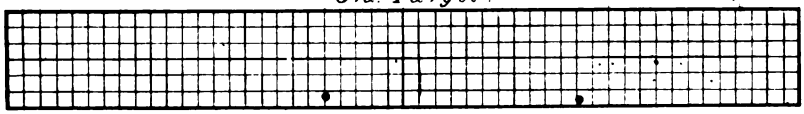
5th. Target.



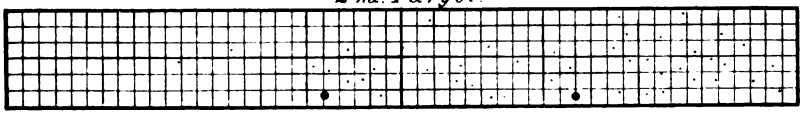
4th. Target.



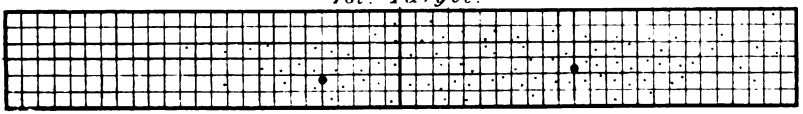
3rd. Target.



2nd. Target.



1st. Target.



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TRIAL No. 31.

8-*in. siege-howitzer.*

Column of ten board targets, each 6 *feet by* 50 *feet, placed* 50 *feet apart, one behind the other.*

Material, inch yellow-pine boards.

Distance of 1*st or nearest target,* 1,000 *yds.*

Firing spherical case shot; each containing 470 *lead balls of* 0.69 *in. cal.*

Weight of projectile, 60 *lbs.* 3 *ozs.*

Bursting charge, 15 *ozs.*

Time fuse, paper, 4½ *seconds.*

Four rounds fired deliberately.

Charge, 6 *lbs.*

Elevation, 6° 10′.

No. of balls fired, 1,880.

No. of hits, 615.

1*st round burst to right and high.*

Time of bursting, 5.25 *seconds.*

2*d round burst to right of target; lost.*

Time of bursting, 5.20 *seconds.*

3*d round burst to right and high.*

Time of bursting, 5 *seconds.*

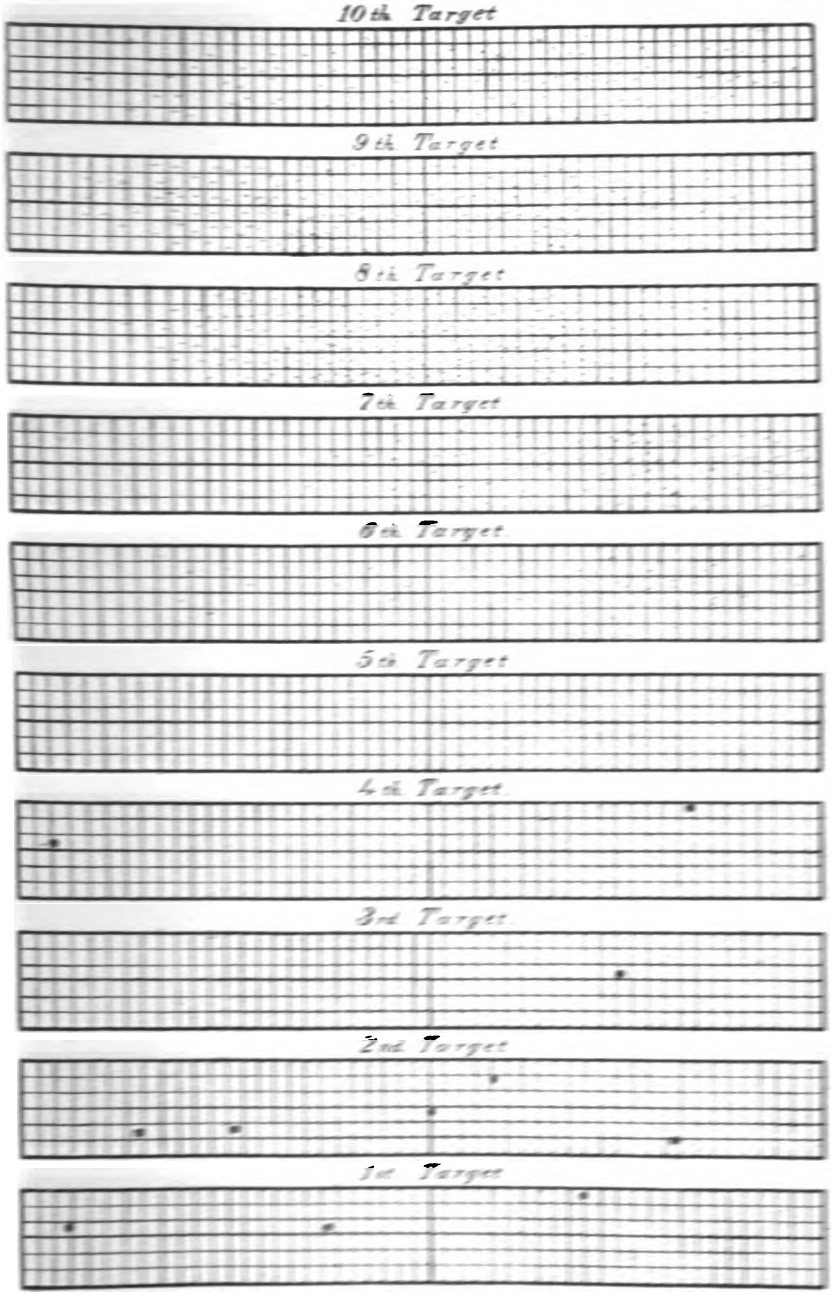
4*th round burst to right and struck ground in front.*

Time of bursting, 5 *seconds.*

Wind across line of fire from left to right, eight miles per hour.

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TRIAL No. 31.



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TRIAL No. 32.

8-*in. siege-howitzer.*

Column of ten board targets, each 6 *feet by* 50 *feet, placed* 50 *feet apart, one behind the other.*

Material, inch yellow-pine boards.

Distance of 1*st or nearest target,* 1,000 *yds.*

Firing spherical case shot, each containing 470 *lead balls of* 0.69 *in. cal.*

Weight of projectile, 60 *lbs.* 3 *ozs.*

Bursting charge, 15 *ozs.*

Time fuse, paper, 4½ *seconds.*

Four rounds fired deliberately.

Charge, 6 *lbs.*

Elevation, 6° 10′.

No. of balls fired, 1,880.

No. of hits, 407.

1*st round:*

Elevation, 6° 10′.

Fuse, 4½ *seconds.*

Time of bursting, 5.25 *seconds.*

2*d round:*

Elevation, 6° 10′.

Fuse, 4½ *seconds.*

Time of bursting, 5.25 *seconds.*

3*d round:*

Elevation, 6° 10′.

Fuse, 4½ *seconds.*

Time of bursting, 5.5 *seconds.*

4*th round:*

Elevation, 6°.

Fuse, 4¼ *seconds.*

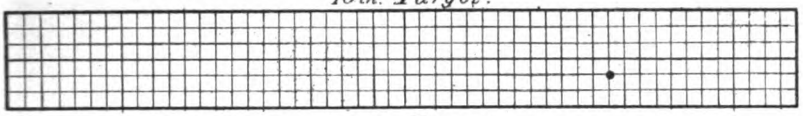
Time of bursting, 4.75 *seconds.*

Only one shell burst within the column.

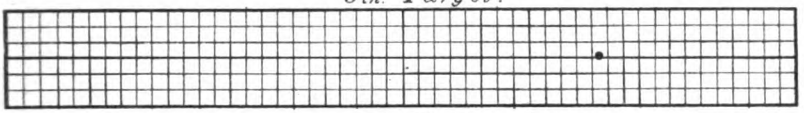
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TRIAL No. 32.

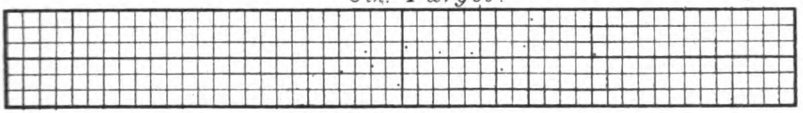
10th. Target.



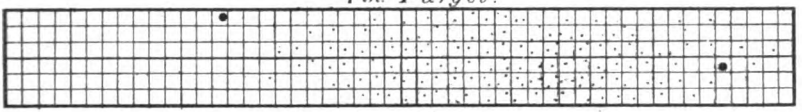
9th. Target.



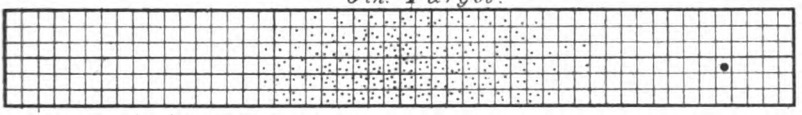
8th. Target.



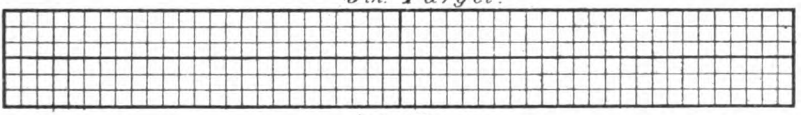
7th. Target.



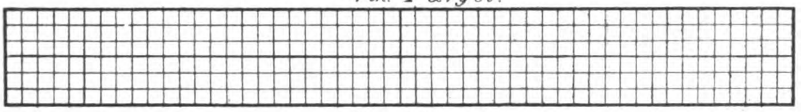
6th. Target.



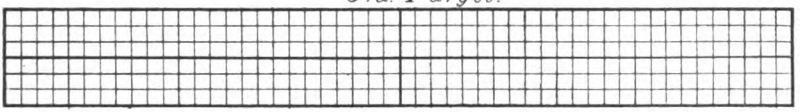
5th. Target.



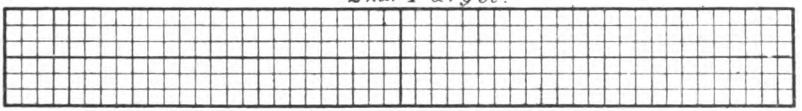
4th. Target.



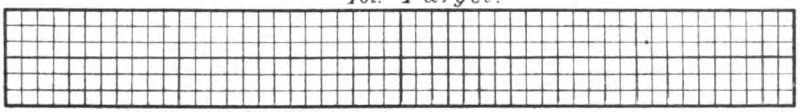
3rd. Target.



2nd. Target.



1st. Target.



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TRIAL No. 33.

Gatling 10-*barrel gun of* 0.42 *in. cal.*

Column of ten board targets, each 6 *feet by* 50 *feet, placed* 50 *feet apart, one behind the other, representing a column of companies approaching gun.*

Material, inch yellow-pine boards.

Distance of 1*st or nearest target,* 1,000 *yds.*

Firing single solid shot with upright cases, deliberately, 40 *balls in each case.*

Elevation, 2°.

No. of shots fired, 600.

No. of hits, 526.

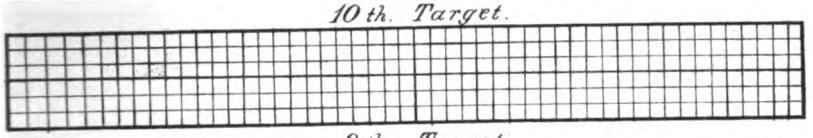
The aim was too low in this case.

Wind from left to right across line of fire, four miles per hour.

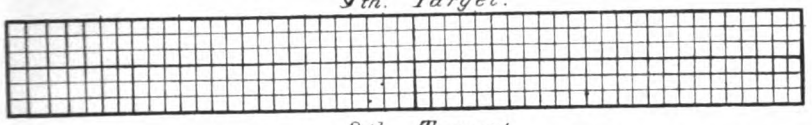
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TRIAL No. 33.

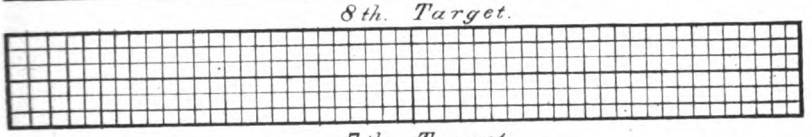
10th. Target.



9th. Target.



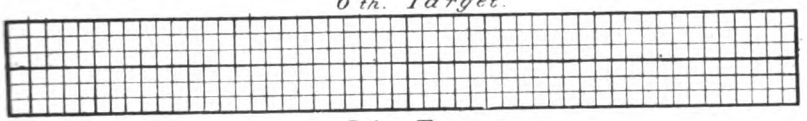
8th. Target.



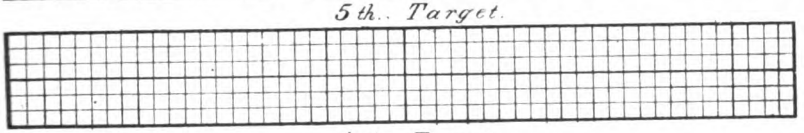
7th. Target.



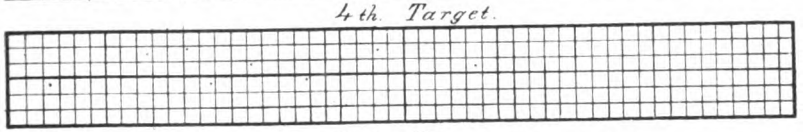
6th. Target.



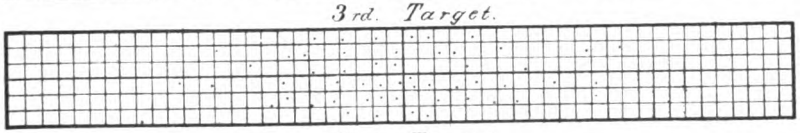
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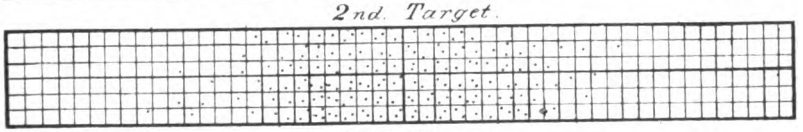
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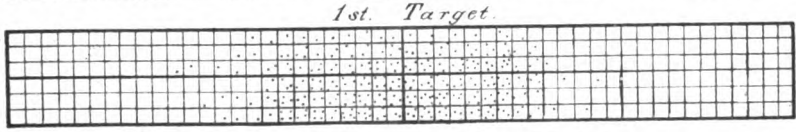
3rd. Target.



2nd. Target.



1st. Target.



N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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TRIAL No. 34.

Gatling 10-*barrel gun of* 0.42 *in. cal.*

Column of ten board targets, each 6 *feet by* 50 *feet, placed* 50 *feet apart, one behind the other, representing a column of companies approaching gun.*

Material, inch yellow-pine boards.

Distance of 1*st or nearest target,* 1,000 *yds.*

Firing single solid shot with upright cases, deliberately, 40 *balls in each case.*

Elevation, 2° 30′.

No. of shots fired, 600.

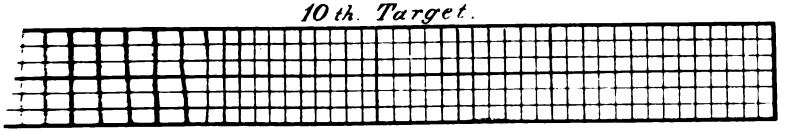
No. of hits, 691.

Wind from left to right across line of fire, four miles per hour.

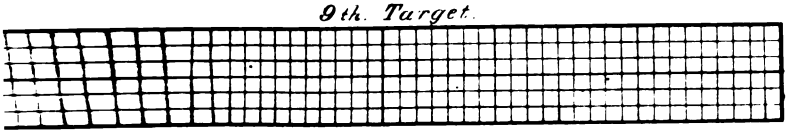
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TRIAL No. 34.

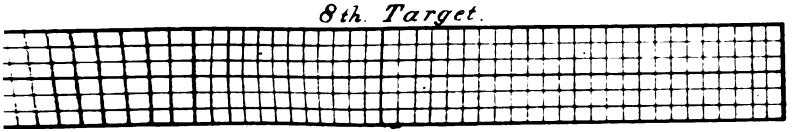
10th. Target.



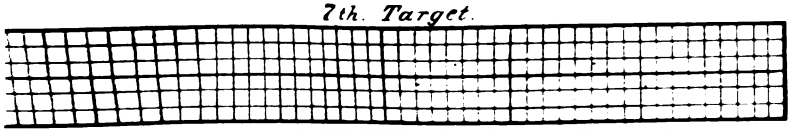
9th. Target.



8th. Target.



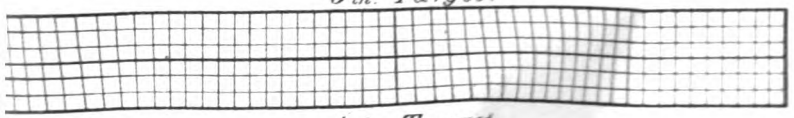
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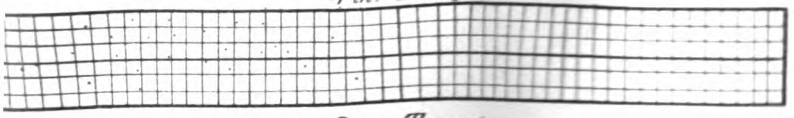
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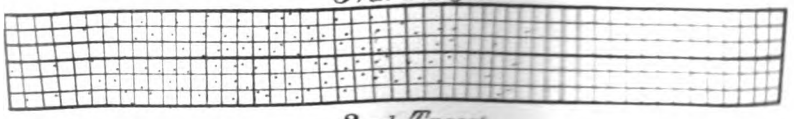
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APPENDIX G.

Proceedings of the board of officers convened under Special Orders Nos. 238 and 253, Adjutant-General's Office, 1873, on horse-equipments, cavalry-equipments and accouterments, saddlers' and smiths' tools and materials, and standard supply-table of ordnance-stores for the cavalry service; with the action of the War Department thereon.

ORDNANCE-OFFICE, WAR DEPARTMENT,
October 7, 1873.

SIR: I have the honor to recommend that a board of ordnance and cavalry officers be assembled, at some point west of the Mississippi River, to consider what changes, if any, should be made in the "modifications of the present horse-equipments," cavalry equipments and accouterments, and saddlers' and blacksmiths' tools and materials for cavalry troops in the field, as now prescribed by General Order No. 60, War Department, Adjutant-General's Office, June 29, 1872, and to recommend a standard table of supply of everything necessary to efficiently provide for the wants of the cavalry service.

If this recommendation is concurred in, it is further recommended that all company commanders of the cavalry be invited to submit their views on the subjects proposed to the board, and that this Office be authorized to submit such information as it may have.

Very respectfully, your obedient servant,

A. B. DYER,
Chief of Ordnance, U. S. A.

The Hon. SECRETARY OF WAR.

OFFICE OF THE BOARD ON CAVALRY-EQUIPMENTS, ETC.,
Watervliet Arsenal, West Troy, N. Y., May 5, 1874.

SIR: I have the honor to transmit herewith the proceedings of the board on cavalry-equipments, &c.

The appendixes and patterns will be forwarded by express.

Very respectfully, your obedient servant,

I. N. PALMER,
Colonel Second Cavalry, President of the Board.

The ADJUTANT-GENERAL, U. S. A.,
Washington, D. C.

REPORT.

Proceedings of a board of officers convened by virtue of the following orders, viz:

[Special Orders No. 238—Extract.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, November 29, 1873.

A board of officers, to consist of Col. R. S. Mackenzie, Fourth Cavalry; Capt. J. J. Upham, Sixth Cavalry; Capt. A. Mordecai, Ordnance Department; Capt. Guy V. Henry, Third Cavalry; Capt. L. H. Carpenter, Tenth Cavalry, will assemble at Fort Riley, Kans., on the 6th day of January, 1874, or as soon thereafter as practicable, to consider and report the changes, if any, that should be made in the horse-equipments, cavalry equipments and accouterments, and saddlers' and blacksmiths' tools and materials for the cavalry service, (reference being made to General Orders No. 60, of June 29, 1872, from this Office,) and to recommend a standard supply-table of the kind and quantities of ordnance-stores necessary to efficiently provide a cavalry company in garrison and field.

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The Chief of Ordnance is authorized to submit such information as he may have upno the subject, and the board is authorized to call for such further information from cavalry officers as may be desirable.

The junior member of the board will record the proceedings.

* * * * * * *

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

[Special Orders No. 253—Extract.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, December 24, 1873.

* * * * * * *

II. The board of officers appointed by paragraph 7, Special Orders No. 238, November 29, 1873, from this Office, to consider and report the changes, if any, that should be made in equipments and accouterments, &c., for the cavalry service, and to recommend a standard supply-table of ordnance-stores to provide a cavalry company, will assemble on the 6th day of January, 1874, the date fixed in the order appointing the board, or as soon thereafter as practicable, at Fort Leavenworth, instead of Fort Riley, Kans.

Col. R. S. Mackenzie, Fourth Cavalry, is relieved as a member of the board, and Col. Innis N. Palmer, Second Cavalry, detailed in his stead.

* * * * * * *

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

FORT LEAVENWORTH, KANS.,
January 8, 1874—10 a. m.

The board met pursuant to the foregoing orders.

Present, all the members. The orders convening the board were read.

The board then adjourned to meet January 10, at 10 a. m.

January 10, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

A communication from the Chief of Ordnance was read, transmitting patterns and papers as follows:

Communications from officers upon the sufficiency of the supply-table of blacksmiths' and saddlers' tools and materials, as issued under General Orders No. 60, War Department, series of 1872, received from the field at the Ordnance-Office, (8 papers.) The substance of these papers is contained in a paper hereto appended and marked "Abstract A."

Communications from officers upon miscellaneous subjects referred to the Ordnance-Office, (5 papers.) A summary of the contents of these papers is contained in a paper appended to the proceedings of the board, and marked "Abstract B."

Guard-book, containing all reports from the field received at the Ordnance-Office on the trial of cavalry equipments. These are contained in a paper hereto appended and marked "Abstract C."

Guard-book, containing reports from the field from cavalry companies which were supplied with experimental cartridge-boxes in 1871. The substance of these reports is embraced in a paper hereto appended and marked "Abstract D."

Three samples of cavalry officers' sabers prepared at the National Armory, received from Ordnance-Office.

Samples of the experimental cartridge-boxes which were issued to certain cavalry companies in 1871, submitted by the commanding officer of the Leavenworth Arsenal in accordance with directions from the Chief of Ordnance. A list is hereto appended and marked "Appendix I."

A cartridge-box invented by Lieut. S. McKeever, received from the Ordnance-Office.

Patterns of equipments and accouterments as furnished by the Ordnance Department, and samples of the six months' supply of tools and stores for a cavalry company in the field, &c., were submitted by the commanding officer of the Leavenworth Arsenal, in accordance with instructions from the Chief of Ordnance. A list is hereto appendep and marked "Appendix II."

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The receipt of the papers and patterns received from the Ordnance-Office were acknowledged.

Capt. Guy V. Henry, Third Cavalry, a member of the board, submitted a pattern of the picket-pin invented by William Lyon, of Fort McPherson, Nebraska, and also a communication from Lieut. A. D. B. Smead, Third Cavalry, upon the subject of equipments and accouterments.

Captain Henry also submitted a communication from Capt. G. Russell, Third Cavalry, upon the same subject.

Colonel Palmer, Second Cavalry, the President of the board, submitted communications from the following officers upon the supply-table of tools and materials:

1. Capt. D. S. Gordon, Second Cavalry, appended to abstract, and marked No. 3, Abstract F.
2. Capt. H. E. Noys, Second Cavalry, appended to abstract, and marked No. 2, Abstract F.
3. Capt. E. R. Wells, Second Cavalry, appended to abstract, and marked No. 4, Abstract F.
4. Lieut. J. N. Wheelan, Second Cavalry, appended to abstract, and marked No. 5, Abstract F.
5. Capt. E. J. Spaulding, Second Cavalry, appended to abstract, and marked No. 6, Abstract F.

The substance of these papers is contained in Abstract F, hereto appended.

All the above papers were read, and consideration thereon deferred.

PRELIMINARY CONSIDERATION OF EQUIPMENTS AND ACCOUTERMENTS.

The board adopted the following resolution:

That the board proceed to a preliminary examination and discussion of each of the articles of equipments and accouterments in their proper order, before finally adopting any pattern, to the end that patterns of any article may be made which may appear to be desirable, and that the board may determine whether it will be necessary to ask any further information from cavalry officers.

The board resolved that it would assemble each day at 10 a. m., with the exception of Sundays. The board then adjourned.

JANUARY 12, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

A communication from First Lieut. George H. Palmer, Sixteenth Infantry, was received and read, with inclosures, consisting of a pamphlet and photograph descriptive of his "Cavalry carrying-braces." Consideration upon this was deferred.

In accordance with its resolution, the board commenced the preliminary consideration of the equipments and accouterments, by taking up the

SADDLE COMPLETE.

The following points were discussed:

1. The proper sizes that should be issued, and the proper width of the pommel-arc.
2. Whether the tree should be covered with rawhide under the black leather, in order to give greater strength and to save the wear consequent upon an irregular surface.
3. As to the advisability of dispensing with sweat-leathers and skirts.
4. As to the strength of the pommel-plates. In many old saddle-trees, submitted to the board by the commanding officer of Leavenworth Arsenal, the pommel-plates were broken.
5. The bars; their projection front and rear, and their curve. A decided difference was found to exist upon these points in the trees examined.
6. The proper shape of the stirrup-loops. No uniformity existed in many examined, but in cases where the stirrup-straps hang correctly the loops were rectangular.
7. Concerning the "D"-ring safe. Whether it is not necessary to have the safe made longer, in order to prevent side-sores on horses.
8. The stirrup, and the proper length of the hood, to prevent the foot from pushing underneath.
9. As to the proper shape of the saddle-bags, their capacity, and the manner in which they should be secured.
10. The material that the girth should be made of, and whether the cincha should be adopted.
11. The shape of the bars of the saddle-tree in relation to the bearing-surface. Many

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of the trees received from contractors, and now on hand, differ so widely from the original model that but few points in the entire length of the bars can rest upon the horse's back.

12. The proper width of the bars was considered.

13. Whether the brass ovals should be fastened with four screw-pins instead of two; each screw-pin to be of a size to be determined, say five-eighths inch.

14. The carbine-socket; whether it should be attached to the "D"-ring or higher up.

The board resolved that the commanding-officer of Leavenworth arsenal be requested to make, after patterns suggested—

One set of leather saddle-bags.

One cincha, with fastenings complete.

THE CURB-BRIDLE.

Upon this subject the following points were discussed:

1. Whether the present pattern of curb-bit is not unnecessarily heavy, and whether the requirements of the service do not demand the adoption of a new pattern in which this objection will be remedied.

2. As to the advisability of placing a loop on the branches of the curb-bit opposite the mouth-piece, so that the reins can be shifted if necessary.

3. Whether the reins of the bridle should be furnished with buckles, instead of being sewed to the rings of the curb-bit, and the proper width of the reins.

4. Whether two or one buckles should be placed on the cheek-piece of the head-stall.

5. Whether two or one buckles should be placed on the throat-lash.

6. Whether the broad-band of the bridle should be made to slide or not.

7. Whether the curb-chain or curb-strap should be adopted.

A resolution was agreed to, requesting the commanding officer of Leavenworth Arsenal to make the following articles, after patterns suggested:

One curb-bit.

One bridle, cavalry, with alterations.

The board then adjourned.

JANUARY 13, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

A communication from Capt. John Mix, Second Cavalry, was received, stating his opinions upon the equipments and accouterments for cavalry, and inclosing a list of materials recommended by him. A reply was written to Captain Mix, acknowledging the receipt of his communication.

THE LYON PICKET-PIN.

A letter was received from William Lyon, of Fort McPherson, describing his patent picket-pin, and inclosing indorsements from Captain Russell, Captain Curtis, and Lieutenant King, Third Cavalry, recommending its adoption. A pattern of the pin, forwarded by Mr. Lyon, was received.

Consideration upon the matter was deferred.

A reply was written Mr. Lyon, acknowledging the receipt of these papers and the pattern.

THE HALTER AND STRAP.

The board then proceeded to the consideration of the halter and strap, and the following points were discussed:

1. Whether it would be advisable to furnish a halter-chain in addition to the halter-strap, for garrison use, in order to save a large expenditure of leather; the chain to be made as light as possible, and not to exceed one pound in weight, to be furnished with a bar at one end, and two rings at proper distances, and a strongly-made snap upon the other end. The chain to be about No. $\frac{1}{0}$ German twist-link, bright.

2. In regard to the halter: whether the pattern now used in artillery would be suitable for cavalry, it being desirable to obtain uniformity if possible.

3. Whether the buckles should be japanned or blued.

THE WATERING-BRIDLE.

Whether the watering-bit should not be strengthened at the joint, as a number of condemned bits, presented for the inspection of the board, were broken at this point.

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HORSE-BRUSH.

The merits of the flexible back were discussed.

THE LINK.

1. The proper length of the snap was considered.
2. Whether the ¾-inch bar-buckle should not be substituted for the horseshoe buckle now in use.

THE LARIAT.

As to the material which would give in its qualities the necessary strength and durability required.

The merits of the horse-hair lariat were discussed, especially upon the question of economy.

A resolution was adopted requesting the commanding officer of Leavenworth Arsenal to furnish the board with the following articles, after patterns suggested:

One halter-chain.

One horse-hair lariat.

The board then adjourned.

JANUARY 14, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

The board continued the consideration of the horse-equipments.

THE PICKET-PIN.

The following points were discussed.

1. Whether it would be advisable to change the present pattern in its length and cross-section.
2. The merits of the Lyon picket-pin were considered.
3. A pattern was suggested with a swivel attached to the loop at the head.

A resolution was adopted, "that, as the order convening the board requires that reference be made to General Orders No. 60, War Department, series of 1872, which designates certain modifications in the equipments issued to the cavalry, the Chief of Ordnance be requested to furnish any information in his possession upon the subject.

A telegram was sent to the Ordnance-Office asking for this information; also for any obtainable in regard to nickel-plated bits and felt saddle-cloths.

THE NOSE-BAG.

The board discussed the question of the nose-bag upon the following points:

1. Whether it should not be retained.
2. Whether the saddle-cloth, for feeding-purposes, prescribed by General Orders No. 60, War Department, series of 1872, would be required if the nose-bag is furnished.
3. Assuming that the nose-bag is to be issued, whether it would not be necessary to modify the old pattern, so as to obtain some ventilation, and thus obviate the chief objection urged against it. Perforated metal plates, or perforated leather straps, sewed to the side, were suggested.

THE SADDLE-BLANKET.

Upon this the following were considered:

1. As to the best material, the present being too thin and light.
2. The proper size.

THE FELT SADDLE-CLOTH.

The merits of the felt saddle-cloth were discussed, and whether it would be advisable to issue it, in addition to the saddle-blanket, as a part of the horse-equipments.

THE SPURS AND STRAPS.

Concerning the spurs and straps: whether it would not be desirable to make the strap ¾-inch wide, with a bar-buckle.

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THE FORAGE-SACK.

Whether or not the forage-sack should be narrowed at the opening, to facilitate closing the bag.

THE BRUSH AND SHOE-POUCH.

As to the advisability of dispensing with the brush and shoe-pouch, issued under General Orders No. 60, War Department, series of 1872, and making other provisions for carrying the brushes and horseshoes.

THE TIN CUP.

The expediency of furnishing a block-tin cup, to hold one quart, was considered.

A resolution was adopted requesting the commanding officer of Leavenworth Arsenal to make, for the use of the board, the following articles, after patterns suggested:

One nose-bag.
One spur-strap, (pair of.)
One forage-sack.
One tin cup.
One picket-pin.
One link, cavalry.

The board then adjourned.

JANUARY 15, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

A communication from Col. J. J. Reynolds, Third Cavalry, was received, recommending the Lyon picket-pin. A reply was sent, acknowledging the receipt of this letter.

A communication from Maj. Lewis Merrill, Seventh Cavalry, was received, describing certain improvements in lariats, side-lines, and curry-combs made by him. The paper was read and filed.

A telegram was received from the Ordnance-Office, stating that no reports had been received on the subject of the new modifications in equipments, issued under General Orders No. 60, War Department, series 1872, and that the reports on nickel-plated bits and felt saddle-cloths had been mailed.

A letter was sent to the commanding officer at Fort Hays, Kansas, requesting information upon the durability of linen-web girths, issued to companies of cavalry at his post.

THE SIDE-LINE.

1. The proper length of the chains, the different sizes, and the proportion of each.
2. Whether it would not be well to supply the chain with open links, or with some arrangement to permit of lengthening or shortening at pleasure.

A number of patterns submitted by the commanding officer of Leavenworth Arsenal, and a model furnished by Col. Nelson A. Miles, Fifth Infantry, were examined.

IRON PINS.

The advisability of furnishing the following was considered: Iron pins to secure the picket-line, in the field or on scouts, 3 feet in length and 1¼ inches in diameter. To be furnished with a strong ring, 4 inches in diameter, passing through the pin about 2½ inches below the top of the head.

CANTEENS.

It was discussed as to whether the canteen should be covered with two thicknesses, and felt was suggested as a good material.

A resolution was adopted requesting the commanding officer of Leavenworth Arsenal to make for the use of the board the following articles, after description furnished:

One side-line.
One iron pin.
One canteen, with two coverings.

The board then adjourned.

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JANUARY 16, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

A communication was received from Capt. A. E. Bates, Second Cavalry, giving his views upon cavalry equipments and accouterments.

A reply was sent to Captain Bates acknowledging the receipt of his communication.

A pattern of Lieut. George H. Palmer's "Cavalry Carrying-Braces" was received and examined.

A letter was written to Lieutenant Palmer, acknowledging the receipt of his patterns and the papers describing it.

The board proceeded to the consideration of cavalry accouterments upon the following points:

THE BRACES, EXPERIMENTAL.

This system was carefully considered by the board, and the reports upon the subject received from the Ordnance-Office were examined.

The great weight of testimony was found to be against the use of the braces for the mounted soldier, as it incommoded him, and is irksome.

THE SABER-BELT AND PLATE.

1. As to the plate best adapted for the service.

2. Should the saber-slings be attached to the belt at two points or one; if at two points, whether the slings should be secured by a hook or otherwise.

It was suggested that both slings could be joined together and attached to the belt at one point with a strong brass hook, or by the Stuart's attachment.

It was proposed to furnish the belt with brass slides, so that they can be shifted or removed. The proper manner of placing a hook for hooking up the saber was considered.

THE SABER-KNOT.

No improvement in the saber-knot was suggested, except that it should be made strong and light, the strap to be, say, $\frac{5}{8}$ inch wide, with two loops.

THE PISTOL-HOLSTER.

The following suggestions received consideration:

1. That the holster be made to fit the pistol now in use better than the pattern in service, and that the flaps be made smaller.

2. The substitution of a strap for the flap, in view of the adoption of metallic ammunition.

3. To retain the swivel attachment on the pistol-holster issued with the cavalry equipments, (experimental,) with a movement of $\frac{1}{4}$ circle instead of the circle, to prevent the holster from swinging entirely around.

CARBINE SLING AND SWIVEL.

Whether it would not be advisable to adopt the old pattern of the separate wide sling, as the papers before the board show a large majority of the officers of cavalry decidedly in favor of this.

CARTRIDGE BOXES AND POUCHES.

Samples of the experimental cartridge-boxes issued by the Ordnance Department to certain cavalry companies in 1871 were examined by the board, and other patterns submitted by the commanding officer of Leavenworth Arsenal.

A pattern was suggested similar to the pouch issued with the cavalry equipments, (experimental,) to carry 50 carbine-cartridges, with flaps to prevent the loss of ammunition; and one of the same pattern, to carry 20 rounds, for pistol-ammunition.

THE SCOUTING-BELT.

The merits of the scouting-belt were discussed, and as to whether or not it would be advisable to recommend the adoption of a plain belt, with loops for 40 cartridges, to be issued when called for.

A resolution was adopted requesting the commanding officer of Leavenworth Arsenal to make the following articles, after patterns described:

One pouch for carbine-ammunition, with sling.

One pouch for pistol-ammunition.

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One pistol-holster, with attachment.
One saber-knot.
One set saber-slings.
One belt, with movable slide.
The board then adjourned.

JANUARY 17, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

BLACKSMITHS' AND SADDLERS' TOOLS.

The board proceeded to the consideration of blacksmiths' and saddlers' tools and materials as issued under General Orders No. 60, War Department, series of 1872. The papers referred to the board upon this subject by the Ordnance Department, and contained in Abstract A, hereto appended, were read.

Samples of the tools and materials now issued by the Ordnance Department were submitted by the commanding officer of Leavenworth Arsenal, and examined by the board.

A communication was received from Capt. S. M. Whitside, Sixth Cavalry, stating his opinion and recommendation upon cavalry equipments and accouterments.

A reply was written to Captain Whitside, acknowledging the receipt of his communication.

The patterns of side-lines, lariats, and curry-comb forwarded by Major Merrill, Seventh Cavalry, were received and examined.

A letter was written to Major Merrill, acknowledging the receipt of these articles and the papers describing them.

A communication from Capt. Lewis Thompson, Second Cavalry, upon the supply-table of tools and materials, was submitted by Col. I. N. Palmer, Second Cavalry, the president of the board.

A communication from Capt. John A. Irwin, Sixth Cavalry, upon cavalry equipments and accouterments, was submitted by Col. I. N. Palmer, Second Cavalry, the president of the board.

Both of these papers were read and filed.

The board then adjourned.

JANUARY 19, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

The board resumed the consideration of the blacksmiths' and saddlers' tools and materials upon the following points:

1. As to the quality of the tools now issued.

CAVALRY-FORGE.

1. Whether the mountain-howitzer forge and tools issued under General Orders No. 60, War Department, series of 1872, are adapted to the cavalry service, the bellows, fire-box, and tools being very small.

2. Whether it would not be advisable to furnish a forge and tools of larger size, to be carried, with the material, in a two-wheeled vehicle made for the purpose.

HORSESHOES AND HORSESHOE-NAILS.

The different kinds submitted by the commanding officer of Leavenworth Arsenal were examined and their merits discussed.

A communication was received from the Chief of Ordnance, dated January 15, 1874, stating that no complete sets of horse-equipments, as prescribed by General Orders No. 60, War Department, series 1872, have yet been issued, and transmitting the following:

1. Curb-bit, of the pattern issued in 1871, nickel-plated.

2. Reports from the commanding officers of Companies L and K, Sixth Cavalry, upon nickel-plated bits, and a report from the National Armory upon the same subject.

3. Reports from the field during the war upon the felt saddle-cloth.

The substance of the reports upon nickel-plated bits and felt saddle-cloths is contained in a paper hereto appended, and marked "Abstract E."

A reply was written to the Chief of Ordnance, acknowledging the receipt of these papers and patterns.

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CIRCULAR LETTER.

A resolution was adopted by the board, "that a circular be addressed to field-officers and commanding officers of companies of cavalry, in which certain questions should be asked, in order to obtain information as to the views of cavalry officers upon points suggested to the board in its preliminary examination of the matter before it."

A resolution was adopted requesting the commanding officer of Leavenworth Arsenal to make, after a pattern described, the following:

A two-wheeled vehicle, constructed to carry the blacksmiths' and saddlers' tools and materials, and forge and bellows complete.

The board then adjourned.

JANUARY 20, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

The board resumed the discussion upon the

SUPPLY-TABLE OF MATERIALS.

The relative merits of neat's-foot oil and Collins's prepared harness-oil, as preservatives for leather, were considered. Upon motion it was decided that the opinion of cavalry officers should be asked upon this point, and a question to this effect was added in the circular.

The recorder submitted the circular drawn up in accordance with the resolution of the board, and, upon examination, it was adopted, and copies directed to be forwarded without delay.

The circular letter was as follows:

"OFFICE OF THE BOARD ON CAVALRY EQUIPMENTS,
"*Fort Leavenworth, Kans., January* 20, 1874.

"SIR: The board convened by Special Orders Nos. 238 and 253, series of 1873, from the War Department, to consider the subject of cavalry accouterments and equipments, &c., desire the following information, and in accordance with authority granted by the War Department request that you will return this with the questions answered without delay.

"By direction of the board:

"L. H. CARPENTER,
"*Captain Tenth Cavalry, Brevet Colonel, Recorder.*

"1. Question. Do you find saddles now issued to be made too narrow for the withers of large horses; if so, what increase in width is necessary, and what percentage should be made of the increased size?

"Answer.

"2. Question. Do you think any protection required for the soldier, in the way of sweat-leathers or saddle-skirts?

"Answer.

"3. Question. Would you prefer the hair girth, or cincha, to linen webbing or the present girth?

"Answer.

"4. Question. Would you prefer the cincha-strap fastening instead of the buckle-fastening now in use?

"Answer.

"5. Question. Would you prefer a leather or a canvas saddle-bag?

"Answer.

"6. Question. Can you recommend a curb-bit for cavalry better than the one now in use, or any changes therein?

"Answer.

"7. Question. Do you desire a light halter-chain in addition to the leather halter-strap, for use in garrison or elsewhere?

"Answer.

"8. Question. Can you recommend any change in the curry-comb?

"Answer.

"9. Question. Can you recommend any change in the horse-brush?

"Answer.

"10. Question. Can you recommend any change in the lariat? One made of horse-hair is proposed.

"Answer.

"11. Question. Can you suggest any change in the picket-pin?

"Answer.

"12. Question. Do you think it desirable to issue a dark-blue felt saddle-cloth in addition to the saddle-blanket now issued?

"Answer.

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"13. Question. What suggestions have you to make in regard to side-lines, especially as to the length of chains?

"Answer.

"14. Question. It is proposed to furnish iron pins 3 feet long, with rings at top, in order to fasten the picket-line close to the ground while in the field. Would this be desirable?

"Answer.

"15. Question. Should the saber-slings be attached to the belt by two straps at one point, after the plan of Stuart's attachment, or from two separate points as heretofore?

"Answer.

"16. Question. Can you suggest any changes in the present pistol-holster? Since the adoption of metallic ammunition is the flap necessary, or can a strap be substituted?

"Answer.

"17. Question. Do you desire to make any suggestions in regard to the carrying of carbine or of pistol ammunition in garrison or in field?

"Answer.

"18. Question. What is your opinion of the mountain-howitzer forge now issued under General Orders No. 60, War Department, June 29, 1872?

"Answer.

"19. Question. It is proposed to carry the portable forge, tools, and material for the blacksmith and saddler in a two-wheeled vehicle made for the purpose. Do you think this desirable or not?

"Answer.

"20. Question. What manufacture of horseshoes do you prefer?

"Answer.

"21. Question. What manufacture of horseshoe-nails do you prefer?

"Answer.

"22. Question. What sizes of horseshoes should be issued and what proportion of each size, and what amount for a six months' supply?

"Answer.

"23. Question. What additions or changes do you propose, in kind and amount, in the saddlers' tools as now issued?

"Answer.

"24. Question. What additions or changes do you propose, in kind or amount, in the blacksmiths' tools as now issued?

"Answer.

"25. Question. If the saddlers' horse is adopted for use in garrison, can the separate clamp be dispensed with?

"Answer.

"26. Question. What additions or changes do you propose in the saddlers' material as now issued for a six months' supply?

"Answer.

"27. Question. Is the quantity of horseshoe-nails, as now issued, sufficient for a six months' supply?

"Answer.

"28. Question. Have you tried the Collins prepared harness-oil; if so, do you prefer it to neat's-foot oil?

"Answer.

"29. Make any general suggestions that you may desire."

The board considered the time that should be allowed to hear from the cavalry officers written to, and to have the necessary patterns made, and the necessity for an adjournment during that time was decided upon.

By direction of the board a telegram was sent to the Chief of Ordnance, asking whether the commanding officer of Leavenworth Arsenal was authorized to furnish a clerk for the use of the board.

ADJOURNMENT UNTIL FEBRUARY 20, 1874.

A resolution was adopted "that when the board adjourned it will be adjourned until February 20, 1874, in order to give the time required for the construction of patterns, and to obtain information from cavalry officers at remote stations."

A communication was directed to be sent to the Adjutant-General, United States Army, explaining the reasons for the adjournment of the board until February 20, 1874, and requesting authority to call upon the commanding officer of the Watervliet Arsenal, New York, for the manufacture of certain samples and patterns, and information desired by the board.

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In the event of obtaining the authority asked for in the above letter, the recorder was directed to correspond with the commanding officer of the Watervliet Arsenal, and request the manufacture of the patterns, and call for the information required.

The recorder was directed to request information upon nickle-plated bits from the commanding officer of Springfield Armory, and to ask the Chief of Ordnance to furnish, for the use of the board, a set of standard gauges for the saddle-tree.

During the adjournment of the board the recorder was directed to receive all official communications, and to carry on any correspondence that might be necessary, the whole to be submitted to the board.

The board then adjourned.

FEBRUARY 20, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. Innis N. Palmer, Second Calvary; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. A. Mordecai, Ordnance Department; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. Guy V. Henry, Third Cavalry.

A communication from Capt. Guy V. Henry, Third Cavalry, dated February 12, 1874, was read, stating that he was under medical treatment, and therefore would be prevented from being present at the meeting of the board. Filed as a part of the record.

A letter was written to the Adjutant-General of the Army, informing him of the absence of Capt. Guy V. Henry, and the cause.

The board then adjourned.

FEBRUARY 21, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. Innis N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. A. Mordecai, Ordnance Department; Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. Guy V. Henry, Third Cavalry.

The following papers were submitted to the board:

1. Copy of a letter from Capt. J. G. Trimble, First Cavalry, dated January 10, 1874, to the Chief of Ordnance, United States Army, referred to the board by the Chief of Ordnance, containing criticisms on the "new cavalry equipments," and especially recommending the belt with loops for cartridges for field-service.

2. Communication from the Ordnance-Office, dated January 22, 1874, confirming telegram of same date, authorizing the commanding officer of Leavenworth Arsenal to furnish a clerk for the use of the board.

3. Letter from Major N. B. Sweitzer, Second Cavalry, dated January 23, 1874, stating his views upon the equipments and accouterments, and inclosing communications upon the same subject from Capt. Lewis Thompson, Second Cavalry, and Capt. George L. Tyler, Second Cavalry.

4. Copy of instructions from the Chief of Ordnance to the commanding officer of Watervliet Arsenal, dated January 27, 1874, directing him to prepare such samples and furnish such information as may be desired by the board of cavalry equipments. Furnished for the information of the board by the Chief of Ordnance.

5. Copy of a letter to the commanding officer of the National Armory, Springfield, Mass., dated January 28, 1874, requesting information upon the subject of nickel-plating, any changes or improvements that may have been made in the process, the probable cost of plating bits, &c.

6. Copy of letter written to Capt. C. B. McLellan, Sixth Cavalry, dated January 28, 1874, requesting him to furnish the board with a sample of the picket-pin invented by his first sergeant.

7. Communication from Capt. John Mix, Second Cavalry, dated January 30, 1874, recommending that the leather parts of the horse-equipments be issued separately when called for by company commanders.

8. Communication from the Adjutant-General, United States Army, Washington, D. C., dated January 30, 1874, stating that the commanding officer of Watervliet Arsenal was instructed to prepare such samples and furnish such information as might be desired by the board.

9. Copy of letter written to Col. B. H. Grierson, Tenth Cavalry, dated January 31, 1874, requesting him to furnish to the board samples of the horseshoe invented by Mr. Kiernan, chief farrier of the cavalry-depot, Saint Louis, Mo., and samples of the clinching-tongs and curb-bit of spring-steel recommended by him, together with such reports and information in regard to these articles as might be obtainable.

10. Copy of letter written to the commanding officer of Watervliet Arsenal, New York, dated January 31, 1874, requesting him to prepare samples of articles mentioned

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therein for the use of the board; descriptions to be furnished by the commanding officer of Leavenworth Arsenal.

11. Letter from Capt. Henry E. Noyes, Second Cavalry, submitting patterns of lariat, picket-pin, and pistol-holster; dated February 2, 1874.

12. Communication from Maj. J. G. Benton, Ordnance Department, commanding National Armory, Springfield, Mass., dated February 4, 1874, giving information upon the subject of nickel-plating.

13. Communication from the Chief of Ordnance, United States Army, dated February 5, 1874, submitting the following patterns for the consideration of the board:

One feed-bag, presented by the American Horse-Feeder Company, Boston, Mass.

Three bridles, submitted by James H. Wilson, Nashville, Tenn.

One side-line.

One G. W. Barnes's pully bridle-bit.

One watering-bridle.

One bridle.

One Holmes's belly-band fastener.

14. Recommendations from officers of the First Cavalry upon the supply-table of tools and materials, forwarded by Col. Alvan C. Gillem, First Cavalry, to the Chief of Ordnance, and referred from the Ordnance-Office to the board on cavalry equipments, in an indorsement dated February 6, 1874. The substance of these recommendations is contained in a paper attached to these proceedings and marked "Abstract F."

15. Letter from Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, dated February 10, 1874, submitting one of Wait's patent feed-bags and two side-lines for the examination of the board.

16. Copy of communication written to the Chief of Ordnance, dated February 11, 1874, acknowledging the receipt of a letter from the Ordnance-Office, dated February 6, 1874, and of the patterns mentioned therein.

17. Copy of Special Orders No. 27, War Department, Adjutant-General's Office, February 9, 1874, directing Col. Innis N. Palmer, Second Cavalry, the president of the board, to visit Watervliet Arsenal, New York, on business relating to the manufacture of articles for the use of the board, and upon completing this to return to Fort Leavenworth, Kansas.

18. A communication from the Chief of Ordnance, dated February 9, 1874, stating that many complaints have been made to the Ordnance-Office in relation to the quality of horseshoes, horseshoe-nails, and blacksmiths' and farriers' tools now issued, and inviting the attention of the board to the matter.

19. Copy of a letter written to the Chief of Ordnance, dated February 11, 1874, requesting to be furnished with a set of standard gauges for the saddle-tree, for the use of the board.

20. A communication from Capt. Wm. R. Shoemaker, M. S. K. O., dated February 12, 1874, acknowledging the receipt of the circular letter of the board, and stating that he agrees with the opinions of Capt. William McCleave, Eighth Cavalry, and submits model of a new cavalry-bit.

21. A letter from Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, dated February 17, 1874, transmitting list of stores and papers submitted by him to the board on cavalry equipments, stated as follows:

1. A list of ordnance-stores laid before the board January 10, 1874, in accordance with instructions from the Chief of Ordnance, dated December 16, 1874.

2. A list of experimental cartridge-boxes laid before the board January 10, 1874.

3. Copy of a letter from Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, to the commanding officer of Watervliet Arsenal, New York, dated January 31, 1874, giving a list of the articles sent to aid in making samples desired by the board.

4. Copy of detailed instructions sent by Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, to the commanding officer of Watervliet Arsenal, of samples desired by the board to be fabricated at that arsenal.

5. Copy of letter from Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, dated February 2, 1874, transmitting the above detailed instructions.

6. Copy of letter received by Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, from the commanding officer of the National Armory, Springfield, Mass., dated February 4, 1874, giving the kind and amount of materials best suited for cleaning small-arms and brass-work.

22. A letter from Capt. C. B. McLellan, Sixth Cavalry, dated February 12, 1874, inclosing model of a picket-pin for the consideration of the board.

23. A letter from Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, dated February 18, 1874, transmitting a list of articles submitted for the examination of the board, with the price of each stated.

24. Copy of a letter written to the commanding officer of Watervliet Arsenal, New York, February 15, 1874, requesting certain patterns made in addition to those asked for in a previous communication.

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25. Letter from Major Merrill, Seventh Cavalry, dated February 21, 1874, describing a pattern of curry-comb submitted by him.

All of the foregoing papers were read and filed.

The following articles were examined by the board:

1. A drawing of the Kiernan horseshoe, from Col. B. H. Grierson, Tenth Cavalry.
2. Model for sweat-leathers, from Captain Spaulding, Second Cavalry.
3. Drawing for curb-bit, from Captain Spaulding, Second Cavalry.
4. Pattern of picket-pin, from Captain Spaulding, Second Cavalry.
5. Belt, with loops for cartridges, from Captain Bernard, First Cavalry.
6. Drawing of curb-bit, from Major Du Bois, Third Cavalry.
7. Model of curb-bit, from Capt. W. R. Shoemaker, M. S. K. O.
8. Model of picket-pin, from Capt. C. B. McLellan, Sixth Cavalry.
9. Patterns for curb-bit, lariat, picket-pin, and pistol-holster, from Capt. Henry E. Noyes, Second Cavalry.

Articles submitted by Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, as follows:

One felt saddle-cloth, gray, bound yellow.
One felt saddle-cloth, blue, bound yellow.
One felt saddle-cloth, gray.
One felt saddle-cloth, blue.
One horse-brush, No. 101.
One horse-brush, No. 401.
One curry-comb, No. 18.
One curry-comb, No. 480.
Two hair cinchas.
Four cincha straps.
One pair California saddle-bags.
One hair lariat.
Two pair backstraps.
Two waist-belts and plates, non-commissioned officers'.

The prices of the articles submitted by Captain Mordecai were stated by him in the list submitted.

10. Feed-bag, presented by American Horse-Feeder Company, Boston, Mass.
11. Three bridles, made by James H. Wilson, of Nashville, Tenn.
12. Side-line.
13. G. W. Barnes's pulley bridle-bit.
14. Watering-bridle.
15. Bridle.
16. Homes's belly-band fastener.

The above, from No. 10 to 16, received from the Ordnance-Office.

17. Wait's patent feed-bag, from Capt. A. Mordecai, Ordnance Department.
18. Two side-lines, from Capt. A. Mordecai, Ordnance Department.
19. Hopples, presented by Col. I. N. Palmer, Second Cavalry.
20. Side-lines, presented by Col. I. N. Palmer, Second Cavalry.
21. Picket-pin, presented by Lieut. W. C. Rawolle, Second Cavalry.

The board then adjourned.

FEBRUARY 23, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. A. Mordecai, Ordnance Department; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. Guy V. Henry, Third Cavalry.

The following paper was read to the board:

1. A letter from Capt. D. G. Gordon, Second Cavalry, with indorsements, upon the trial of the hopples submitted by Col. I. N. Palmer, Second Cavalry, referred to the board by the Chief of Ordnance in the indorsement dated February 17, 1874.

The patterns expected from Watervliet Arsenal not having been received, a telegram was sent to the commanding officer of that arsenal, requesting to be informed when the samples would be forwarded.

A belt, with loops for cartridges, showing the manner in which the belt-holster and pistol-pouch could be carried, was received from Capt. E. R. Wells, Second Cavalry, and examined by the board.

The board then adjourned.

FEBRUARY 24, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. A. Mordecai, Ordnance Department; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. Guy V. Henry, Third Cavalry.

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An answer was received to the telegram sent to the commanding officer of Watervliet Arsenal, New York, stating that the patterns would be forwarded on the 25th instant.

In consequence of the delay and inconvenience caused by the necessity of having samples and patterns desired by the board made at Watervliet Arsenal, a communication was directed to the Adjutant-General, United States Army, asking for authority to adjourn to Watervliet Arsenal, in order to expedite the business before the board.

A letter was written to the commanding officer of Watervliet Arsenal, New York, requesting him to make two curb-bits of steel, after models submitted by Capt. W. R. Shoemaker, M. S. K. O. The models and letter of Captain Shoemaker describing them were forwarded for the information of Colonel Hagner, with the request that they be returned.

The board then adjourned.

FEBRUARY 25, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. A. Mordecai, Ordnance Department; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. Guy V. Henry, Third Cavalry.

A communication from Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, was read, submitting two samples of Hazen's cartridge-belt, with loops for cartridges.

A list of the patterns submitted to the board, not enumerated in Appendix I and Appendix II, was made, and is attached to these proceedings, and marked Appendix III.

The board considered and discussed the various patterns submitted.

The board then adjourned.

FEBRUARY 26, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. A. Mordecai, Ordnance Department; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. Guy V. Henry, Third Cavalry.

CAVALRY OFFICERS' SABERS.

In accordance with the request of the Chief of Ordnance, expressed in letter of December 24, 1873, the board proceeded to examine the samples of cavalry officers' sabers submitted to it, and, upon consideration, decided to recommend the manufacture of the sample marked "Saber No. 1," altered as follows: to have tip of scabbard similar to that on saber No. 2, and the weight of the hilt reduced as much as possible.

A letter was written to the Chief of Ordnance, notifying him of this action.

ACTION OF THE BOARD UPON CERTAIN PATTERNS AND MODELS SUBMITTED TO IT.

The following was agreed to unanimously:

Upon examination and discussion of the patterns submitted to the board, as shown in the lists marked Appendix I and Appendix III, attached to these proceedings, it was resolved that the board throw aside all, as being unsuited for the cavalry service, excepting the following, which are retained for further consideration, viz:

One cartridge-box, marked F, with tin holder for cartridges.
One cartridge-box, marked F, with wooden holder for cartridges.
One cartridge-pouch, marked E.
One cartridge-pouch, (Dyer's pattern.)
One Hazen's cartridge-belt, with double row of loops.
One belt with loops, from Captain Bernard, First Cavalry.
One belt with loops, from Benicia Arsenal, submitted by Capt. A. Mordecai, Ordnance Department.
One belt with loops, from Capt. E. R. Wells, Second Cavalry.
One drawing of curb-bit, from Major Du Bois, Third Cavalry.
Two models of curb-bit, from Capt. W. R. Shoemaker, M. S. K. O.
One drawing of curb-bit, from Capt. H. E. Noyes, Second Cavalry.
One side-line, submitted by Col. I. N. Palmer, Second Cavalry.
One side-line, made by Colonel Mordecai, at request of board.
One picket-pin, from William Lyon.
One model of sweat-leather, from Captain Spaulding, Second Cavalry.
One lariat, from Major Merrill, Seventh Cavalry.
One hair lariat, from Benicia Arsenal, through Colonel Mordecai.
One drawing of Kiernan horse-shoe, from Col. B. H. Grierson, Tenth Cavalry.
One curry-comb No. 2, from Major Merrill, Seventh Cavalry.
One curry-comb No. 18, from Colonel Mordecai.

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One horse-brush, No. 101, from Colonel Mordecai.
One horse-brush, No. 401, from Colonel Mordecai.
One felt saddle-cloth, gray, bound yellow, from Colonel Mordecai.
One felt saddle-cloth, blue, bound yellow, from Colonel Mordecai.
One felt saddle-cloth, gray, from Colonel Mordecai.
One felt saddle-cloth, blue, from Colonel Mordecai.
Two hair cinchas, from Benicia Arsenal, through Colonel Mordecai.
Four cincha straps, from Benicia Arsenal, through Colonel Mordecai.
One California saddle-bags, from Benicia Arsenal, through Colonel Mordecai.
One saddle-bags, made by Colonel Mordecai, at request of board.
One Homes's belly-band fastener, from Ordnance-Office.
The board then adjourned.

FEBRUARY, 27, 1874—10 a. m.

The board met pursuant to adjournment.
Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. A. Mordecai, Ordnance Department; 4. Capt. L. H. Carpenter, Tenth Cavalry.
Absent: 1. Capt. Guy V. Henry, Third Cavalry.
A letter was received from Lieut. Col. John P. Hatch, commanding Fourth Cavalry, recommending changes in the supply-table to the Chief of Ordnance. Referred to the board, from the Ordnance-Office, in an indorsement dated February 24, 1874.
The substance of this paper is contained in Abstract F.
A communication was received from Col. P. V. Hagner, Ordnance Department, commanding Watervliet Arsenal, New York, dated February 25, 1874, transmitting a list of the samples fabricated by his direction, in accordance with the request of the board, and stating his opinion upon various changes suggested in the cavalry equipments and accouterments.
The patterns from Watervliet Arsenal not having arrived, and the board deeming it inexpedient to proceed until they were received, adjourned until March 4, 1874.

MARCH 4, 1874—10 a. m.

The board met pursuant to adjournment.
Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. A. Mordecai, Ordnance Department; 4. Capt. L. H. Carpenter, Tenth Cavalry.
Absent: 1. Capt. Guy V. Henry, Third Cavalry.
A pattern of curb-bit, invented by Mr. M. A. Penn, was received from the Ordnance-Office, together with a description of the invention, referred to the board by the Chief of Ordnance in an indorsement dated February 28, 1874.
The papers were read and the patterns examined. Consideration upon the matter was deferred.
A communication was read from Capt. George L. Tyler, Second Cavalry, describing his patterns of scouting-belt, with loops for cartridges, and pistol-holster and cartridge-box.
The patterns described in the above letter having been received were examined.
A telegram was received from the Adjutant-General, United States Army, Washington, D. C., dated March 4, 1874, approving the request of the board to adjourn to Watervliet Arsenal.
The patterns fabricated at Watervliet Arsenal, by request of the board, were received and examined.
The board then adjourned.

MARCH 5, 1874—10 a. m.

The board met pursuant to adjournment.
Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. A. Mordecai, Ordnance Department; 4. Capt. L. H. Carpenter, Tenth Cavalry.
Absent: 1. Capt. Guy V. Henry, Third Cavalry.
A letter was read from Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, dated March 5, 1874, stating that the price of the back-straps for the saddle, as furnished from Benicia Arsenal, is $1.04, instead of 52 cents as given in a previous letter.

RESOLUTION TO ADJOURN UNTIL MARCH 25, 1874.

The board having completed its business as far as practicable at Fort Leavenworth, and desiring to give additional time to receive answers to the circular-letter of the board from a number of prominent cavalry officers stationed at distant posts, who

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have not been heard from, and the necessary time for the commanding officer at Watervliet Arsenal to fabricate and alter patterns, it was—

Resolved, That, in accordance with authority granted by the War Department, the board adjourn to meet at Watervliet Arsenal on the 25th instant, and that Capt. J. J. Upham, Sixth Cavalry, a member of the board, be directed to proceed with as little delay as possible to West Troy, N. Y., in order to personally inform the commanding officer of Watervliet Arsenal of the detailed instructions required in making and altering the proposed patterns.

A letter was written to the commanding officer of Watervliet Arsenal, requesting him to make and alter certain patterns mentioned in a list furnished to Capt. J. J. Upham, Sixth Cavalry, who is instructed to give the detailed instructions, personally, necessary in the fabrication of said patterns.

The following is the list furnished to Capt. J. J. Upham, Sixth Cavalry:

1. Saddle, arranged for the cincha straps, after the California style.
2. Sweat-leathers, after patterns of Captain Spaulding, Second Cavalry.
3. Hood for stirrups, to extend one-half inch below the bottom of stirrup.
4. Curb-bit; pattern made at Watervliet Arsenal, by request of the board, to be lighter.
5. Halter-chain, of steel, to be lighter than the pattern made at Watervliet Arsenal, by request of the board.
6. A lariat, to be made of proper thickness, of shoe-thread.
7. Lyon's picket-pin, altered.
8. Saddle-blankets, larger and of heavier material than the pattern now in service.
9. Side-line, according to pattern furnished, with double billet and 1¼-inch roller-buckle.
10. Saddle-bags, to be made same size as the canvas saddle-bag, mentioned in Ordnance Memoranda No. 13, of fair and black bridle-leather.
11. Saber-belt, slides for saber-slings to be made flat, of brass; loops for cartridges, after patterns furnished.
12. Pistol-holster, to be furnished with a strap instead of flap.
13. Cartridge-pouch for pistol.

A letter was written to the Adjutant-General, United States Army, reporting the adjournment of the board until the 25th instant, and stating reasons.

The board then adjourned.

WATERVLIET ARSENAL, N. Y., *March* 25, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Capt. J. J. Upham, Sixth Cavalry; 2. Capt. A. Mordecai, Ordnance Department; 3. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. Guy V. Henry, Third Cavalry.

ORDER RELIEVING CAPT. GUY V. HENRY, THIRD CAVALRY, AS A MEMBER, AND DETAILING CAPT. WILLIAM HAWLEY, THIRD CAVALRY, IN HIS STEAD.

Special Orders No. 45, War Department, Adjutant-General's Office, Washington, D. C. March 2, 1874, was read, relieving Capt. Guy V. Henry, Third Cavalry, as a member of the board, and detailing in his stead Capt. William Hawley, Third Cavalry.

Captain Hawley being present, reported for duty with the board.

A letter from Captain Mordecai, Ordnance Department, commanding Leavenworth Arsenal, dated March 12, 1874, was read, stating that the patterns retained for further consideration had been forwarded to the commanding officer of Watervliet Arsenal, as requested by the board.

A communication from the Ordnance-Office, Washington, D. C., dated March 9, 1874, was received, transmitting patterns of picket-pins invented by Lieut. F. K. Upham, First Cavalry, General Albert Pike, and the picket-pin adopted by the Saint Louis board. (See Ordnance Memoranda No. 11, pp. 18 and 20,) with two letters inclosed from Lieut. F. K. Upham, describing his invention.

These papers were read and filed.

A letter from Col. B. H. Grierson, Tenth Cavalry, superintendent of the mounted recruiting service, was received, transmitting four communications from Mr. John Kiernan, chief farrier cavalry-barracks, Saint Louis, Mo., describing patterns of curb-bits, made of spring-steel; two patterns of clinching-tongs, and two patterns of cast-steel horseshoes invented by him.

These papers having been read by the board were filed for future consideration.

The patterns of picket-pins from the Ordnance-Office, and the patterns forwarded by Col. B. H. Grierson, Tenth Cavalry, mentioned in the foregoing papers, were received and examined.

A communication from the Chief of Ordnance, dated March 11, 1874, was received and

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read, stating that the commanding officer of the Watervliet Arsenal issued February 25, 1874, to the commanding officer of Leavenworth Arsenal, three gauges for inspecting cavalry saddle-trees, for the use of the board.

A letter from W. B. Johns, and inclosures, were read, describing his patent leggins, which he submits for the consideration of the board. Referred by the Chief of Ordnance in an indorsement dated March 10, 1874.

The pattern of leggins described in the above papers was received from the Ordnance-Office and examined by the board.

A communication from Mr. M. A. Penn was read, describing his improved combination bridle-headstall, which he submits to the board. Referred by the Chief of Ordnance in an indorsement dated March 2, 1874.

The headstall was received from the Ordnance-Office and examined.

A letter from Quartermaster-General M. C. Meigs, U. S. A., was read, submitting a sample of the Namaqua gun-sling, used by the British officers and sportsmen in South Africa. Referred by the Adjutant-General United States Army, in an indorsement dated March 7, 1874.

The pattern was examined by the board.

A copy of a letter from Capt. A. Mordecai, Ordnance Department, commanding Leavenworth Arsenal, dated March 20, 1874, was read, forwarding patterns and articles to the Ordnance-Office, which were referred for consideration of the board by the Chief of Ordnance, and on all of which action has been taken.

The board then adjourned.

MARCH 26, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Capt. J. J. Upham, Sixth Cavalry; 2. Capt. A. Mordecai, Ordnance Department; 3. Capt. William Hawley, Third Cavalry; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. I. N. Palmer, Second Cavalry.

TRANSPORTATION OF THE GATLING GUN WITH CAVALRY.

A communication was received from the Chief of Ordnance, dated March 25, 1874, stating that, by authority of the War Department, he transmits copies of letters on the manner of packing the Gatling gun on pack-animals, for the consideration and report of the board, and requests that the board determine the best manner of transporting this gun, whether on a carriage or on a pack-animal. States, also, that the commanding officer of the National Armory, Springfield, Mass., has been directed to send to Watervliet Arsenal a Gatling gun, pack-saddle, &c.

Capt. John R. Edie, Ordnance Department, appeared before the board and presented the Gatling gun, pack-saddle, &c., forwarded from the National Armory, for the consideration of the board.

The board then proceeded to examine the method of packing the gun on pack-animals proposed by Maj. J. G. Benton, Ordnance Department, and the patterns submitted, as explained to them by Captain Edie, who caused animals to be packed with the gun and stand in the manner suggested, and also exhibited the method of firing from the stand.

The board then adjourned.

MARCH 27, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Capt. J. J. Upham, Sixth Cavalry; 2. Capt. A. Mordecai, Ordnance Department; 3. Capt. William Hawley, Third Cavalry; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Col. I. N. Palmer, Second Cavalry.

The board resumed the consideration of the proper manner of transporting the Gatling gun for the cavalry service.

The board then adjourned.

MARCH 28, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Capt. J. J. Upham, Sixth Cavalry; 2. Capt. A. Mordecai, Ordnance Department; 3. Capt. William Hawley, Third Cavalry; 4. Capt. L. H. Capenter, Tenth Cavalry.

Absent: 1. Col. I. N. Palmer, Second Cavalry.

The board resumed the consideration of the methods proposed for transporting the Gatling gun.

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RESOLUTION ON THE TRANSPORTATION OF THE GATLING GUN.

The following resolution was offered and unanimously adopted:

Resolved, That the board, after due consideration of the subject in its different bearings, is of the opinion—

1. That the Gatling gun cannot be carried on a pack-animal with benefit to the cavalry service. It would be almost impossible to carry the gun so packed in the rapid pursuit of Indians, and in case of an attack by them the necessary delay in unpacking and mounting the gun would render it useless. If the gun was mounted in action on the stand proposed by Major Benton, it would have to be conveyed from one position to another by hand, and where a rapid advance or retreat would be made, the gun could not be packed in an instant or carried by men on foot rapidly, and in some cases might have to be abandoned in consequence.

2. This proposed method of transportation would require the use of two pack-animals.

3. In view of these facts, the board would recommend that the Gatling gun be mounted on light wheels, the carriage capable of being drawn by one animal, the ammunition to be carried on the axle, upon each side of the gun, in boxes of suitable shape and size.

The board is of the opinion that it is very desirable, if possible, to construct the gun-carriage so that the wheels track with ordinary vehicles used with cavalry.

The board then proceeded to test the working qualities of the cavalry force prescribed in Ordnance Memoranda No. 13.

A letter from E. H. Fitler & Co., Philadelphia, to Col. P. V. Hagner, Ordnance Department, dated March 25, 1874, upon material for lariats, was referred to the board by Colonel Hagner and read.

A communication was sent to the Chief of Ordnance, Washington, D. C., informing him of the action of the board upon the transportation of the Gatling gun with cavalry, and inclosing a copy of the resolution.

The board then adjourned.

MARCH 30, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

Major Merrill, Seventh Cavalry, appeared before the board and submitted patterns of lariats made from shoe-thread and a pattern of side-line, which were explained by him.

OPINIONS OF CAVALRY OFFICERS.

The replies from one hundred and twenty-seven cavalry officers to the circular letter of the board, having been received, were considered; the substance of these opinions being placed in tabular form in a paper appended to these proceedings, and marked Abstract G. The original papers are numbered and accompany the abstract.

The board then adjourned.

MARCH 31, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

A letter from Lieut. W. R. Parnell, First Cavalry, dated February 23, 1874, was read, submitting a pattern of curry-comb, with strap, as his invention. The curry comb was received and examined.

The board then adjourned.

APRIL 1, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

A letter was received and read from J. R. King, of Saint Paul, Minn., dated March 17, 1874, describing the King-Tileston cartridge-box, which he submits to the board. The cartridge-box described in this paper was received and examined.

The board resumed the consideration of the horse-equipments.

The board then adjourned.

APRIL 2, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

A communication from Col. P. V. Hagner, Ordnance Department, was read, in which he recommends that some system be adopted for the uniform and efficient instruction of the mechanics belonging to cavalry companies.

The board resumed the consideration of the horse-equipments.

The board then adjourned.

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APRIL 3, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

A letter from Schuyler, Hartley & Graham, of New York, dated April 1, 1874, was read, submitting a description of the Spencer graduated felt saddle-cloth, and indorsements in favor of it; also inclosing a letter from Captain Russell, Third Cavalry, reporting favorably upon it.

A letter from Major Merrill, Seventh Cavalry, was received and read, stating the advantages claimed in patterns of side-lines submitted by him.

Also, a letter from the same officer, submitting patterns of curry-combs with the hoof-hook attached, and open-backed, with handle of iron.

The board resumed the consideration of the horse-equipments.

The board then adjourned.

APRIL 4, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

Additional papers were received from the Ordnance-Office upon the subject of the "cavalry carrying-braces," being submitted in an indorsement by the Chief of Ordnance, dated April 2, 1874, No. 1655, and were read before the board.

Samples of the knapsack, boxes, and braces invented by Lieutenant Palmer were received from the Ordnance-Office and examined by the board.

The board resumed the consideration of the horse-equipments.

The board then adjourned.

APRIL 6, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

Communications from Schuyler, Hartley & Graham, of New York, and indorsements relating to the Spencer felt saddle-cloth were read to the board. These papers were submitted in an indorsement from the Ordnance-Office, dated April 2, 1874.

Mr. William P. Kellogg appeared before the board and exhibited and explained his portable forge, with fan.

The board resumed the consideration of the horse-equipments.

ACTION UPON CERTAIN PATTERNS AND MODELS SUBMITTED.

The following resolution was adopted:

Resolved, That upon examination of the patterns and models named in the following list, some of which were retained for further consideration, and upon which action has not been taken, the board is of the opinion that it is not advisable to adopt them, or any of them, for use in the cavalry service, although many have merit which the board recognizes:

Cartridge-box marked F, with tin holder for cartridges.
Cartridge-box marked F, with wooden holder for cartridges.
Belt, with loops, from Captain Bernard, First Cavalry.
Belt, with loops, from Benicia Arsenal.
Belt, with loops, from Capt. E. R. Wells, Second Cavalry.
Belt, with loops, from Capt. Geo. L. Tyler, Second Cavalry.
Pistol-holder, from Capt. Geo. L. Tyler, Second Cavalry.
Pistol-cartridge box, from Capt. Geo. L. Tyler, Second Cavalry.
Model of curb-bit, from Capt. H. E. Noyes, Second Cavalry.
Lariats, (three patterns,) from Major Merrill, Seventh Cavalry.
Side-line, from Major Merrill, Seventh Cavalry.
Curry-comb, No. 2, from Major Merrill, Seventh Cavalry.
Curry-comb, No. 18, from New York Agency, Ordnance Department.
Hair cinchas, from Benicia Arsenal.
Cincha-straps, from Benicia Arsenal.
California saddle-bags, from Benicia Arsenal.
Homes's belly-band fastener, received from Ordnance-Office.
Curb-bit, invented by W. A. Penn, received from Ordnance-Office.
Picket-pin, invented by Lieut. F. K. Upham, First Cavalry, received from Ordnance-Office.
Picket-pin, invented by General Albert Pike, received from Ordnance-Office.
Four curb-bits, from John Kiernan, chief farrier, cavalry-depot, Saint Louis, Mo.
Two clinching-tongs, from John Kiernan, chief farrier, cavalry-depot, Saint Louis, Mo.

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One steel shoe, (horse,) from John Kiernan, chief farrier, cavalry-depot, Saint Louis, Mo.

Leggins, patented by W. B. Johns, received from Ordnance-Office.

Combination bridle-headstall, invented by W. A. Penn, received from Ordnance-Office.

Mamaqua gun-sling, submitted by Quartermaster-General M. C. Meigs, received from Ordnance-Office.

Curry-comb, with strap, from Lieut. W. R. Parnell, First Cavalry.

Cartridge-box, known as the King-Tileston pattern, received from J. R. King, of Saint Paul, Minn.

Portable forge, with fan, submitted by W. P. Kellogg.

Cavalry carrying-braces, invented by Lieutenant Palmer, Sixteenth Infantry.

Knapsack, invented by Lieutenant Palmer, Sixteenth Infantry.

Cartridge-boxes, invented by Lieutenant Palmer, Sixteenth Infantry.

The board then adjourned.

APRIL 7, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

The board resumed the consideration of the horse-equipments.

After discussing the saddle complete, the board finally agreed unanimously upon the resolution marked No. 1.

Upon the subject of the bridle the board finally adopted unanimously the resolution marked No. 2.

Unon the subject of the curb-bit the board adopted the resolution marked No. 3, by the following vote:

YEAS—Col. I. N. Palmer, Second Cavalry; Capt. J. J. Upham, Sixth Cavalry; Capt. Wm. Hawley, Third Cavalry; Capt. L. H. Carpenter, Tenth Cavalry.

NAY—Capt. A. Mordecai, Ordnance Department.

Upon the subject of the saddle-bags the board agreed unanimously upon the resolution marked No. 4.

A letter from Schuyler, Hartley & Graham, of New York, was read, stating the prices at which the felt-cloth could be furnished.

The board then adjourned.

APRIL 8, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

Mr. R. A. Goodenough appeared before the board and explained the horseshoe patented by him, and exhibited samples. The board had several horses shod after this system, under the direction of Mr. Goodenough.

The board then witnessed a further trial of the mountain-howitzer forge, at which a heavy piece of tire-iron was welded in five minutes.

The board then continued the discussion upon the horse-equipments.

The board then adjourned.

APRIL 9, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

The board resumed the consideration of the horse-equipments, and agreed unanimously upon resolutions marked Nos. 5, 6, 7, 8, and 9.

Upon the subject of the cavalry equipments, experimental, and the cavalry accouterments, the board adopted unanimously the resolutions marked Nos. 10 and 11.

The board then adjourned.

APRIL 10, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

The discussion of the saddlers' and blacksmiths' tools and materials and the supply-table was taken up. The board agreed unanimously upon the resolutions marked Nos. 12, 13, 14, 15, and 16; and upon the question of the equipments necessary for a cavalry-trooper adopted the resolution marked No. 17.

The board then adjourned.

APRIL 11, 1874—10 a. m.

The board met pursuant to adjournment. Present, all the members.

The board agreed unanimously to the resolution marked No. 18, recommending the adoption of the changes, alterations, and additions to the horse-equipments, cavalry-equipments, accouterments, and supply-table of tools and materials for the cavalry-service, set forth in the previous resolutions.

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The following was adopted:

Resolved, That the board, having completed all of the business before it, adjourn until the 28th of April, 1874, in order to give time for the preparation of its report, together with the drawings, photographs, and samples of the patterns adopted.

Capt. A. Mordecai, Ordnance Department, desiring to return as soon as possible to his station at Leavenworth Arsenal, Kansas, (that post having been ordered to be discontinued,) asked permission to be excused from further attendance, he having been present during all of the transactions of the board, and having voted upon its different resolutions.

The board then adjourned.

APRIL 28, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. W. Hawley, Third Cavalry; 3. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. A. Mordecai, Ordnance Department, by permission of the board; 2. Capt. J. J. Upham, Sixth Cavalry.

The drawings and photographs of patterns not being completed, the board adjourned.

APRIL 29, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. W. Hawley, Third Cavalry; 3. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. A. Mordecai, Ordnance Department, by permission of the board; 2. Capt. J. J. Upham, Sixth Cavalry.

The drawings and photographs of patterns not being completed, the board adjourned.

APRIL 30, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. W. Hawley, Third Cavalry; 3. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. A. Mordecai, Ordnance Department, by permission of the board, 2. Capt. J. J. Upham, Sixth Cavalry.

A pattern of cartridge-vest, submitted by Schuyler, Hartley & Graham, of New York, was examined. The board decided that its advantages and merits were not such as to warrant its adoption in the service.

An additional pattern of side-line, consisting of leglets of leather connected by wire-cord, was received from Maj. Lewis Merrill, Seventh Cavalry. Upon examination and consideration, the board concluded that wire-rope was objectionable for this use, on account of the difficulty of mending breakages which are apt to occur in the field.

An indorsement from the Chief of Ordnance, United States Army, dated April 21, 1874, was received, submitting a sample of Cline's luggage-supporter, together with papers relating thereto, and requesting an expression of opinion on its merits. Upon examination and consideration of the papers accompaying this patent, the board finds that it has been tested in the field and reported upon, and that the mass of the testimony appears to be unfavorable, in consequence of its effect in wearing holes in the luggage and interfering with high withers. It could not be used in the cantle of the saddle in connection with the new saddle-bags adopted by the board; and, in view of these facts, the board is of the opinion that the merits and advantages of the "Cline luggage-supporter" are not such as to warrant the board in recommending its adoption in the cavalry service.

Maj. G. W. Schofield, Tenth Cavalry, submitted to the board an article which it is thought might be a valuable addition to the cavalry-equipments. This consists of a combination of the hoof-hook, hammer, and two small screw-drivers, of sizes suitable for taking apart and putting together the carbine and pistol; it can be carried in the pocket of the soldier. The cost, as given by Major Schofield, is about 16 cents. A pattern of this instrument, with drawings, is submitted with these proceedings, and it is recommended that a trial be made of the same.

A pattern hitching-strap was received from Mr. David Ross, No. 87 Water street, New York. Upon examination, the board decided not to recommend it for adoption in the cavalry service.

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MAY 2, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. William Hawley, Third Cavalry; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. A. Mordecai, Ordnance Department, by permission of the board.

The commanding officer of Watervliet Arsenal was requested to forward the cavalry forge-cart, and other models and patterns adopted by the board, to the War Department, Washington, D. C.

The photographs and drawings not being finished, the board adjourned until May 4, 1874.

MAY 4, 1874—10 a. m.

The board met pursuant to adjournment.

1. Present: Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry. 3. Capt. William Hawley, Third Cavalry; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. A. Mordecai, Ordnance Department, by permission of the board.

The proceedings of the board were read and approved.

The board then adjourned.

I. N. PALMER,
Colonel Second Cavalry, President.
J. J. UPHAM,
Captain, Sixth Cavalry.
A. MORDECAI,
Captain, Ordnance Department.
WM. HAWLEY,
Captain, Third Cavalry.
L. H. CARPENTER,
Captain, Tenth Cavalry, Recorder.

MAY 5, 1874—10 a. m.

The board met pursuant to adjournment.

Present: 1. Col. I. N. Palmer, Second Cavalry; 2. Capt. J. J. Upham, Sixth Cavalry; 3. Capt. William Hawley, Third Cavalry; 4. Capt. L. H. Carpenter, Tenth Cavalry.

Absent: 1. Capt. Mordecai, Ordnance Department, by permission of the board.

There being no further business before it, the board adjourned *sine die*.

I. N. PALMER,
Colonel Second Cavalry, President of the Board.
L. H. CARPENTER,
Captain, Tenth Cavalry, Recorder of the Board.

RESOLUTIONS.

RESOLUTION No. 1.

The saddle complete.

The board is of the opinion that the saddle, as now established for the cavalry service, should be changed to conform to the following, namely:

The McClellan tree, according to the drawings and patterns submitted; the parts to be smooth and well painted with white lead; the pommel-arc, pommel-plate, cantle-arc, cantle-plate, and straps for stirrup-loops to be of wrought iron let into the wood, and to be fastened thereto by iron rivets; the stirrup-loops to be of wrought iron, rectangular in shape. The tree to be covered with black leather; the seams on the cantle and on the pommel to be re-enforced by welts of leather; to be without skirts. The shield and the ovals to be of brass, as at present, and to be firmly attached by brass screw-pins not less than $\frac{3}{8}$ inch in length. The rings, with their staples on the front ends of bars, and foot-staples, as now issued, to be of brass. Two brass rings, $1\frac{1}{4}$ inches interior diameter, to be fastened by brass staples into the rear ends of the side-bars. The girth-strap over the pommel to be 38 inches long when finished, and that over the cantle to be 39 inches long when finished. These straps to be attached to the D-ring on the off side as at present, and on the near side to a circular ring $2\frac{1}{2}$ inches in diameter. Safes of stout leather, of the pattern in drawing, 5 by $5\frac{1}{2}$ inches, to be placed under the rings; to be riveted to the girth-straps and to the girth-billet on the off side, and to the girth-strap only on the near side.

The saddle-trees to be of three sizes, as at present:

No. 1. Length of seat, 11 inches, 15 per cent.

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No. 2. Length of seat, 11½ inches, 50 per cent.
No. 3. Length of seat, 12 inches, 35 per cent.
The length of the side-bars to correspond with the length of the seat. The other dimensions to be the same in all trees, as shown in drawing.
The girth to be of strong blue-linen webbing, 7½ inches wide and 25 inches in length, measured from the inside of roller, on 2-inch buckle, to the inside of curved part of the D-ring, and the rings as at present, to be of iron, japanned black; the safes of heavy leather, of size and shape as indicated in the drawing.
Coat-strap as at present, excepting that the buckles are to be of brass.
Stirrup-leathers as at present.
Stirrups to be of wood, of the present pattern; the sole to be 3 inches wide. The hood to be of thick harness-leather, stamped with letters U. S. in the center of front; the shape to be as in the drawing; the bottom of hood to project ¾ inch below the plane of the under side of the stirrup.
The carbine-socket to be as at present. All iron buckles and iron rings to be japanned black.

RESOLUTION No. 2.

The curb-bridle.

The board is of the opinion that the headstall and reins of the curb-bridle now established for the cavalry service, should be changed to conform to the following, namely
The headstall, of black bridle-leather, to be composed of one crown-piece, the ends split, forming one cheek-strap billet on each side; two cheek-straps, one chape and one brass bar-buckle sewed to the lower end of each, and one brass bar-buckle to the upper end of each; one throat-latch, with brass bar-buckle at each end; one brow-band, as at present; two brass ornaments, one on each side of the brow-band, fastened thereto by rivet passing through cut between billets. The general size of the headstall and the width of the leather parts as at present.
The reins, of black bridle-leather, to be attached to bit by brass bar-buckles, the other ends to be sewed together at equal distance from the buckles, one rein forming a thong eighteen inches long, beyond the stitching. The length and width of reins as at present. The frame of all brass buckles to be lighter than the iron buckles now in use, like the photograph and pattern submitted.

RESOLUTION No. 3.

The curb-bit and curb-strap.

The board is of the opinion that hereafter the curb-bit should be made as follows, namely:
The bit of good shear-steel, bright finished; two branches, each shaped as per drawing, with curve at the top for cheek-strap billet; slot in the branch for curb-strap; eye at the lower end of branch, into which is welded the ring for the rein; one mouth-piece, securely riveted to the branches; one cross-bar, securely riveted to the branches near the lower end; two ornaments of cast brass, the letters U. S. raised thereon, riveted to the branches, as in the pattern. Bits to be of three varieties, all alike, except in the form of mouth-pieces. All mouth-pieces to be six-tenths (0″.6) of an inch in diameter, and four (4″.75) inches and seventy-five hundredths of an inch between the branches.
The height of the arch to be as follows, namely:
No. 1, 0.5 inch.
No. 2, 1.0 inch.
No. 3, 1.5 inch.
To be manufactured in the following proportion, and to be so furnished to troops, unless otherwise called for, namely:
20 per cent. of No. 1.
70 per cent. of No. 2.
10 per cent. of No. 3.
That the curb-strap should be made as follows, namely:
One safe-strap 7½ inches long, 1¼ inches wide, on the face of which is sewed one strap 20 inches long and ⅝ inch wide, the ends forming billets that pass into two bar-buckles of brass, attached to the safe by this strap, like the pattern submitted.

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RESOLUTION No. 4.

The saddle-bags.

The board is of the opinion that the saddle-bags prescribed by General Orders No. 60, War Department, series 1872, should be changed to conform to the following, namely:

To be composed of two pouches and one seat; the body of each pouch to be of black bag-leather, with flap of black collar-leather. Pouches to be 10 by 12 inches in the clear. Gusset, 3 inches wide at bottom, and 2.5 inches wide at top. The off-side pouch, for clothing, to be lined with planters' linen sewed in with gusset, to have an inside pocket of the same linen for brush, soap, &c.; the near-side pouch, for rations, to be lined with planters' linen attached to the leather-work by buttons. A pocket 7 by 5 inches, and 1.5 inches wide in the clear, sewed to the outside of the near pouch for horseshoes and horseshoe-nails; this pocket to have a flap, fastened by buckle and billet. A pocket without flap to be sewed to the outside of the off pouch for horse-brush and curry-comb; the front of this pocket to be cut open for 4 inches and fastened by a leather lacing; the pocket to be 8½ by 5½ inches. The flap to cover each pouch to be 16 by 11¾ inches, to be secured to the top of the back and to the seat by two seams, and by two rivets; to have two billets ¾ inch wide sewed on the inside near the lower edge, 6 inches apart, to enter brass buckles secured by chapes, sewed to the under side of gusset; the letters U. S. to be stamped on front of the flap. A leather strap for securing the saddle-bags to the girth-strap rings to be riveted to the back of each pouch, 3½ inches from the bottom, and 2½ inches from the front edge, to be 15 inches long, and to have ¾-inch wire buckles of brass. The seat of the bags to be 18½ inches long in front, and 16½ inches long in rear; to fit smoothly over the cantle; to have one hole for saddle-bag stud, two slits for foot-staples, and two slits for rings; to have two key-straps riveted to the seat to pass through the foot-staples; near pouch to contain two canvas bags 10 inches long, 5¾ inches wide; when finished, to be closed at top by drawing-string, for soldier's rations of sugar and coffee. All to be in accordance with patterns and drawings submitted.

RESOLUTION No. 5.

The halter.

The board is of the opinion that the halter now established should be changed as follows, namely:

To be of the same pattern and dimensions as at present, with these modifications: The nose-band to be of such length as to set more neatly to the head of the horse. The chin-strap to pass loosely through the square loops and through the hitching-strap ring; the ends to be fastened by one 1½-inch bar-buckle, in order to facilitate the adjustment of the halter; two sliding loops to be on the chin-strap. The iron parts to be japanned black, and everything to be as shown in the pattern submitted.

RESOLUTION No. 6.

Saddle-blanket, horse-brush, curry-comb, picket-pin, lariat, link, and nose-bag.

The board is of the opinion that the articles named below, belonging to the horse-equipments, should be changed to conform as follows, namely:

Saddle-blanket.—To be 7 feet long by 6 feet wide, of pure wool, closely woven into stout yarns; to be of a dark-blue color, with a yellow border 3 inches wide, and 3 inches from the edge. The letters U. S., 6 inches high, of yellow color, to be in the center of the blanket.

Horse-brush.—To have one body of stout leather, with Russia bristles, one strap for hand. The stitching around the edge of body to be with brass wire. The size to be that of the sample submitted.

Curry-comb.—A modification of the pattern submitted by Maj. Lewis Merrill, Seventh Cavalry: To be of a good quality of iron, japanned black. The body to be curved at the sides, and strongly re-enforced by wrought-iron plates riveted; one handle of wrought iron, with shank firmly riveted to body, and a hoof-hook attached by one rivet to handle; to have two stops on handle, one to limit the opening, the other to limit the closing, of the hook, as in the sample forwarded.

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The picket-pin.—Of the pattern known as the Lyon's patent: The pin proper to be cylindrical, 15 inches long by ⅝ inch, round iron, and the head stout enough to resist upsetting by being struck. The swivels and ring to be of the pattern and of the dimensions indicated in the drawing, and like the sample submitted. To be painted black.

Lariat.—To be of the best Italian hemp, tightly twisted, 1¼ inches circumference, 30 inches long, of four strands; an eye spliced in one end, the other whipped with small twine, as at present.

Link.—To be ¾ inch wide, of length as at present. At one end a strong snap of steel wire, at the other a bar-buckle and billet, and like sample submitted.

Nose-bag.—To be of the pattern now in use. The head-strap on each side to be sewed to the linen body by two rows of stitching; holes ¼ inch in diameter, to be punched through the two straps and through the body ¾ inch apart from center to center, placed as in the sample submitted.

Resolution No. 7.

The felt saddle-cloth, halter-chain, side-line, sweat-leathers, and stirrup with socket for standard and guidon, to be added to the horse-equipments.

The board is of the opinion that to the horse-equipments now issued the following articles should be added, namely:

The felt saddle-cloth.—A graduated felt saddle-cloth of dark blue, of the same shape and dimensions as the pattern submitted.

Halter-chain.—Of the pattern and dimensions of the sample submitted.

Pair of sweat-leathers.—A modification of the model submitted by Captain Spaulding, Second Cavalry, of the shape and dimensions of the pattern forwarded.

Stirrup with socket for standard and guidon.—The stirrup with the hood same as that described in Resolution No. 1 of the board. The socket of stout leather, to be 6 inches long and 1¼ inches in diameter, interior measurement. The socket to be attached to hood by two straps ¾ inch wide, like the sample submitted.

Side-lines to be composed of leglets of leather fastened by a steel-wire snap, connected by a chain $\frac{3}{16}$ inch iron link, of the same shape and dimensions as the pattern submitted.

The side-lines to be issued of three sizes, in equal proportions:

No. 1. Length of chain 18 inches.

No. 2. Length of chain 24 inches.

No. 3. Length of chain 30 inches.

In this connection the board would desire to state that, in view of the fact that the leather leglets are known to deteriorate in strength upon exposure to moisture and the weather, a number of tests were made with side-lines furnished with steel leglets, calculated to determine the effect of exposure and dirt upon various patterns submitted. Although the board is unable fully to determine the value of the steel leglet, still, as it has the advantages of being less cumbersome, lighter in weight, and can be placed on or taken off the horse with greater facility than the leather, and as the whole question of the side-line is one of great importance to the cavalry service, it is recommended that a number of side-lines be made furnished with leglets of steel, of the pattern submitted, and issued for trial in the field. The board recommends the steel to be used, as iron was found to be too soft to stand the necessary strain without bending out of shape.

Resolution No. 8.

Articles requiring no change belonging to the horse-equipments.

The board is of the opinion that the following articles, pertaining to the horse equipments, prescribed in General Orders No. 60, War Department, series 1872, require no change, namely:

The surcingle of blue-linen webbing 4 inches wide.

Spurs of brass, smooth finish, with steel rowel.

Spur-straps ¾-inch wide; the buckle of brass wire.

Forage-sack of canvas.

Watering-bridle, bit, and reins.

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RESOLUTION No. 9.

Articles of the horse-equipments prescribed in General Orders No. 60, War Department, series 1872, not required.

The board is of the opinion that the following articles, pertaining to the horse-equipments, prescribed in General Orders No. 60, War Department, series 1872, are not required for the cavalry service, namely:

The saddle and feed cloth.

The brush and shoe pouch.

RESOLUTION No. 10.

Cavalry-accouterments.

The board is of the opinion that the cavalry-accouterments, as now established, should be changed to conform to the following, namely:

Saber-belt of black leather, 38 inches and 42 inches in length, and 1¾ inches wide; to have two slides of cast brass, with loop cast at lower end for hooks of the saber-slings. The slides to be free and to move on the belt. A flat brass hook to be riveted to one end of the belt for regulating the length. A loop of cast brass, sewed and riveted at the other end of the belt, to connect with the plate. With the loop of one of the brass slides is fastened, by a cold shut-bend, a saber-hook, made of sheet brass No. —, ⅝-inch wide at loop and ⅞ wide at point.

The belts to be made and furnished of two sizes:

No. 1, 38 inches long, 50 per cent.

No. 2, 42 inches long, 50 per cent.

The saber belt-plate as at present.

Saber-slings and sling-hooks as at present.

Carbine-cartridge pouch of black collar-leather, to contain 40 cartridges for the carbine, composed of one back and one flap cut in one piece, one front, one gusset, 1½ inches wide, excluding seams; the ends of the gusset to extend 1½ inches over the top of pouch, each end to be attached by one rivet to a piece of leather sewed to the front of the pouch; the pouch to have a pocket for the screw-driver, closed by a brass button. The back and front of the pouch to be lined with sheep-skin. The flap to the pouch to be fastened by a brass button. The letters U. S., ¾-inch long, to be stamped on the front of the flap. Two loops, sewed and riveted to the back to receive the waist-belt. The back, front, and flap to have the natural grain of the leather; the gusset to have the grain broken. The shape and dimensions of the pouch to be like the drawings and pattern submitted.

Pistol-cartridge pouch of black collar-leather, the grain broken except in the flap, which is to have the natural surface. The letters U. S. to be stamped on the front of the flap. The parts to be the same as in the pouch for carbine-cartridges, omitting the pocket for screw-driver and the two pieces of leather for the attachment of the prolonged end of the gusset to the front of the pouch, these ends to be sewed to the back and front. The pouch to be lined with sheep-skin. The shape and dimensions to be like the drawings and pattern submitted.

The pistol-holster to be composed of body, strap, and loop for the belt and swivel attachment. The body to be of black bridle-leather, made so that the pistol shall fit neatly into it. The strap to confine the pistol in the holster to be 2¾-inches wide at the widest part, to be sewed to the back of body and fastened in front by a brass button. The loop for the belt to be attached to the body by a swivel-bolt, with head and plate, with stop riveted firmly to loop, and a slot cut in the head into which the stop operates. The end of the swivel-bolt to be riveted to a plate, which plate is fastened by rivets to a leather safe, this latter being attached to the body of the holster by stitching and by three brass rivets. The swivel attachment allows the holster to move on the belt through an arc of 45°. All to be like the drawings and samples submitted.

Cartridge-loops like the pattern submitted by Colonel Hazen, Sixth Infantry. Two for each belt, each consisting of a strip of black bridle-leather, 7¾ inches long and 1¾ inches wide. To one side is sewed a piece of black collar-leather, making 12 loops for carbine-cartridges; to the other side are sewed three loops for the belt, one ⅝ inch wide at each end, and one in the middle 1 inch wide; between these loops are formed eight loops for carbine-cartridges, four on each side of the center loop. Each attachment thus contains twenty cartridges in a double row of loops. To be like the drawings and patterns submitted.

Carbine-sling of black bridle-leather, with brass buckle and tip. The dimensions and finish as at present.

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Carbine-sling swivel same as now prescribed, to be bright instead of blued.

Sabre-knot, same as now prescribed, except that it is to have two instead of one sliding-loop.

Further, the board is of the opinion that to the accouterments should be added a canteen of pattern and material like the sample submitted.

RESOLUTION No. 11.

Cavalry-equipments, experimental, issued, &c.

Upon the subject of the cavalry-equipments, experimental, issued to certain cavalry companies, the board finds in the examination of the reports referred to it by the Ordnance Office, that the great mass of testimony is against the brace system of belts for supporting the weight of the ammunition and arms carried by the cavalry soldier.

This result is obtained after an actual trial in the field; the trooper being incommoded and restricted in his movements by the braces.

The board is, therefore, of the opinion that they are not suitable for the cavalry service.

RESOLUTION No. 12.

Saddlers' and blacksmiths' tools.

The board is of the opinion that the tools for a company of cavalry, as now issued, should be changed to conform to the following, namely:

Saddlers' tools.

12 awls, stitching, assorted.
6 handles, plain, for stitching-awls.
1 handle, patent, for stitching-awls.
1 awl, seat, handled.
1 awl-stub, 2 inches long, with handle, not patent.
1 awl, peg, with patent handle.
1 claw-tool.
1 compasses, common, 6-inch.
2 creasers, cut, lignum-vitæ.
1 edge-tool No. 1.
1 edge-tool No. 2.
1 gauge, draw.
1 hammer, riveting.
1 hammer, saddlers'.
1 knife, half-round, 5-inch.
1 knife, head.
2 knives, shoe.
1 knife, splitting, 6-inch.
1 mallet, head 5¼ inches long, 2¾ inches in diameter, weight 14 to 16 ounces.
2 papers needles, harness, No. 4.
2 papers needles, harness, No. 5.
2 papers needles, harness, No. 6.
1 paper needles, Glover's, No. 3.
1 pair nippers, cutting.
1 oil-stone.
1 pricking-carriage, with three wheels, Nos. 7, 8, and 10.
1 punch, spring, with three points, Nos. 4, 5, and 6.
3 punches, hand, Nos. 7, 8, and 10.
1 punching-block of lead, 5 by 5 inches by ⅞ inch thick.
1 rule, two-foot.
1 rivet-set with two holes.
1 riveting-iron, 3 inches by 3 inches and 1 inch thick.
1 sandstone.
1 shears, 6-inch blade.
1 slicker, steel, with wooden handle.
1 screw-driver, 3-inch.
1 tickler.
2 thimbles.
1 stitching-horse for general service.
1 stitching-clamp for special service.

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Blacksmiths' tools.

1 anvil, 75 pounds.
1 buttress.
1 calipers, smiths'.
1 compasses, pair, 9-inch.
1 chisel, hot iron, handled, 1-inch edge.
1 chisel, cold iron, handled, 1-inch edge.
1 chisel, cold, $\frac{3}{4}$ inch wide.
1 chisel, cold, $\frac{1}{2}$ inch wide.
1 file, flat, bastard, 12-inch.
1 file, half-round, $\frac{1}{2}$ inch by 12 inches.
1 file, square, $\frac{1}{2}$ inch by 12 inches.
1 file, hand, smooth, 10-inch.
1 file, half-round, smooth, 6-inch.
1 file, hard, smooth, 6-inch.
1 file, bastard, flat, 6-inch.
2 files, bastard, round, 6-inch.
2 fi , taper, 3½-inch.
1 fuller, handled.
hammer, hand, handled.
hammer, riveting, small, handled.
1 hammer, riveting, large, handled.
1 hammer, set, 1½ inches square, handled.
2 hammers, shoeing, handled.
1 hammer, sledge, 9 or 10 pounds, handled.
6 handles, file.
1 hardie, 1½-inches face,
2 irons, clinching, plain, whithout hook.
2 knives, shoeing.
2 knives, toe.
1 oil-can, 6 inches long, 1½ inches diameter.
2 punches, nail, and clinch-knife.
1 punch, round, handled, $\frac{3}{8}$ inch diameter.
1 punch, square, handled, $\frac{3}{8}$ inch.
1 punch, hand, round, $\frac{5}{16}$ inch.
1 punch, hand, round, $\frac{1}{4}$ inch.
1 punch, hand, square, $\frac{5}{16}$ inch.
1 punch, center.
2 pincers, shoeing.
1 pritchel.
8 rasps, shoeing, 14-inch.
1 screw-driver, 10-inch.
1 square-steel.
1 stock, die, and two pair dies.
1 tap-screw, $\frac{1}{2}$ to $\frac{3}{4}$ inch.
1 tap-screw, $\frac{3}{8}$ to $\frac{1}{2}$ inch.
1 tongs, No. 1, 15 inches long.
1 tongs, No. 2, 15 inches long.
1 tongs, No. 3, 18½ inches long
1 vise, 15 pounds.
1 vise, hand.
1 wrench-screw.
1 wrench-tap.
2 aprons, leather.
1 box, shoeing, leather.
1 bucket, water, iron.
1 poker, fire.
1 shovel, fire.

The board deems it proper to add a few of the tools enumerated for use in repairing arms issued to the troops, thereby rendering it unnecessary for an armorers' forge and tools to be supplied to a company of cavalry.

RESOLUTION No. 13.

Horseshoes and horseshoe-nails.

After a careful examination of the subject of horseshoeing and horseshoes for cavalry the board desires to express its favorable opinion of the Goodenough shoe and system of shoeing, and its advantages for the service.

The frog and interior part of the horse's hoof are not cut away as in the system now in vogue, and the only preparation consists in trimming the outer wall of the hoof, so

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that the weight of the horse is partly supported by the frog. These shoes are already fitted and weigh much less than the patterns in use, and it is believed that good shoeing can be had from the indifferent mechanics usually found with the cavalry companies, and this with but little instruction. This system does not represent a new and untried idea, as it has been thoroughly tested for a number of years in the United States and in England, and the favorable reports have been received from all directions.

The board therefore recommends that one-half of the horseshoes issued to each cavalry company for one year shall be of the Goodenough pattern, and one-half of the pattern known as the Burden shoe; that 50 per cent. of the horseshoe-nails issued for one year to each cavalry company shall be the Goodenough horseshoe-nail, and 50 per cent. either the Globe or Ausable horseshoe-nail, and after one year the horseshoes and horseshoe-nails shall be furnished to the cavalry service of either of the above-named patterns as called for on requisitions.

The board recommends that models and books, as furnished by Mr. Goodenough, thoroughly explaining his system, be transmitted to each cavalry company, and, if thought necessary, that a competent person be sent to visit the larger cavalry-posts for the purpose of instructing the farriers.

The board is of the opinion that cavalry officers should designate in their requisitions the size of the horseshoes required, as this must differ with the various breeds of horses purchased in different sections of the country; but in cases where the requisition does not mention the sizes the following should be the proportion issued, which the board believes will cover the requirements in most cases.

The board recommends to be issued to a cavalry company for a six months' supply, 1,200 horseshoes—

Of the Burden shoe, size No. 1	50 shoes
Of the Burden shoe, size No. 2	250 shoes
Of the Burden shoe, size No. 3	250 shoes
Of the Burden shoe, size No. 4	50 shoes
	600 shoes.

and 600 Goodenough horseshoes in proportion as above, and in sizes to correspond with those of the Burden pattern.

To be issued to a cavalry company for a six months' supply, 130 pounds horseshoe-nails, 50 per cent. to be either of the Globe or Ausable pattern—

Of size No. 7	50 per cent.
Of size No. 8	50 per cent.

and 50 per cent. or 65 pounds to be of Goodenough horseshoe-nails, in the same proportion and in sizes to correspond with the No. 7 and No. 8 of the Globe or Ausable pattern.

Resolution No. 14.

Cavalry forge-cart.

Resolved, That the board recommends the adoption of a traveling forge-cart to be issued to each company of cavalry, for the purpose of carrying the blacksmiths' bellows, fire-box, anvil, coal, blacksmiths' tools, horseshoes, nails, and iron; also for the purpose of carrying the extra ammunition, saddlers' tools, and supply of leather for the repairs of horse-equipments. The size of the cart, and the different compartments and their dimensions, together with the measurements of the bellows and fire-box, to be designated in the plans and drawings submitted, and suitable harness to be furnished with each cart.

Resolution No. 15.

Standard supply-table of materials.

The board is of the opinion that the following materials should constitute a standard "supply-table" for the ordinary repairs, in a company of cavalry during a period of six months:

Saddlers' materials.

2 pounds black wax, (summer-prepared or winter-prepared, depending on the season in which it is to be used.)
½ pound of beeswax.
2 quarts blacking for leather, (in quart cans, opening closed by screw.)
4 sides leather, bridle.

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100 pounds leather, harness.
36 pounds Collins harness-oil, in six cans.
1 pound rivets and burrs, copper 1″, No. 8.
3 pounds rivets and burrs, copper, $\frac{5}{8}$″, No. 10.
1 pound rivets and burrs, brass, $\frac{5}{8}$″, No. 12.
1 pound rivets and burrs, iron, for side-lines.
1 gross screws, brass, $\frac{1}{2}$″ long, No. 6.
12 pounds soap, castile.
2,000 tacks, iron, 6-ounce.
1,000 tacks, iron, 8-ounce.
2,000 tacks, iron, 12-ounce.
1,000 tacks, iron, 18-ounce.
$2\frac{1}{2}$ pounds thread, shoe, white, No. 10.
$2\frac{1}{2}$ pounds thread, shoe, white, No. 3.
1 pound thread, linen, patent, No. 35.
12 yards webbing, blue linen, $7\frac{1}{2}$″ wide.
24 yards webbing, blue linen, 4″ wide.

Blacksmiths' materials.

1,200 horseshoes.
130 pounds horseshoe-nails.

Cleaning-materials.

2 quires emery-cloth, No. 90.
2 quires emery-cloth, No. 120.
2 quires emery-cloth No. 0. 0.
2 gallons oil, sperm, in 1-gallon cans.
4 pounds rotten-stone.

With the cavalry forge-cart should be furnished:

70 pounds iron, bar, assorted.
5 pounds steel, 1″ square.
5 pounds steel, $\frac{3}{4}$″ square.
To be replaced in this case when necessary by special requisition.

Additional supply-table of materials.

The board deems it proper to designate the following list as an additional supply-table of stores that may, under certain circumstances, be required by a company of cavalry, and which should be issued on special requisition, namely:
1 dozen buckles, bar, brass, $\frac{7}{8}$″.
1 dozen buckles, bar, brass, $\frac{3}{4}$″.
3 dozen buckles, bar, brass, $\frac{5}{8}$″.
3 dozen buckles, wire, brass, $\frac{3}{4}$″.
2 dozen buckles, bar, iron, $1\frac{1}{8}$″.
1 dozen buckles, roller, iron, 1″.
1 dozen buckles, roller, iron, $1\frac{1}{2}$″.
1 dozen buckles, roller, iron, 2″.
1 dozen rings, brass, 1″.25 interior diameter.
2 dozen rings, iron, 1″.7 interior diameter.
1 dozen rings, iron, 2″.5 interior diameter.
1 dozen rings, iron, "D."
1 dozen squares, iron, halter.
1 dozen bolts, iron, halter.
1 dozen staples, foot, brass.
2 dozen staples for rings, brass.
2 dozen ovals, (guard-plates.)
1 gross pins, escutcheon, brass, $\frac{1}{2}$″ long, (screw-pins.)
1 dozen snaps, steel, (for side-lines.)

The board believes that the articles on the "standard supply-table" are all that are, in kind and amount, required ordinarily by a company of cavalry during six months. It is, however, not the intention that all of these stores should in every case be supplied twice a year, but that they should be called for in part or in whole as needed by the company commanders.

In consideration of the bulk and weight of the horseshoes issued to a company of cavalry, and the difficulty and inconvenience of transporting the amount from place to place, the board would suggest that the shoes be drawn as they are needed from the post ordnance-officer, who might be required to draw every six months for all of the companies of cavalry at his post. If advisable for this purpose, the post quartermaster could be recognized as the post ordnance-officer.

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The articles on the additional supply-table should be called for and furnished when it may appear necessary for repairs.

Further, the board is of the opinion that it is not advisable that cleaning-materials should be furnished by the Government, for the care of arms and equipments in the hands of troops, but it considers it proper that the amount specified should be allowed a company commander for the preservation of arms and equipments in store.

RESOLUTION No. 16.

Saddlers' and blacksmiths' tool-bags.

The board is of the opinion that the tool-bags for tools and materials presented in General Orders No. 60, War Department, series 1872, should be changed as follows, namely:

The two pouches to be connected by two seat-straps, one end of each being fastened permanently to opposite pouches, the other end being attached by a brass plate and key, as in the sample submitted.

These bags to be furnished to companies without tools or materials, but to contain one leather and three canvas bags, as at present, for thread, tacks, nails, and wax. To be used upon scouts and in field-service without wagons, and to carry such tools and materials from the general supplies as may be deemed necessary by the officer in command.

RESOLUTION No. 17.

Equipments necessary for a cavalry-trooper.

The board is of the opinion that the regular equipments necessary for a cavalry-trooper are as follows, namely:

1 saddle complete.
- 1 saddle-tree, leather-covered.
- 2 stirrup-straps.
- 2 stirrups.
- 6 coat-straps.
- 1 carbine-socket and strap.
- 1 girth.

1 curb-bridle.....
- 1 headstall.
- 1 pair of reins.
- 1 bit.
- 1 curb-strap.

1 halter.....
- 1 headstall.
- 1 hitching-strap.

1 watering-bridle.
1 pair saddle-bags with two ration-bags.
1 blanket.
1 surcingle.
1 link.
1 side-line.
1 nose-bag.
1 lariat.
1 picket-pin.
1 horse-brush.
1 curry-comb.
1 pair spurs.
1 pair spur-straps.

1 saber-belt.....
- 2 saber-slings.
- 2 saber-sling slides.
- 1 belt and plate.

1 pouch for carbine-cartridges.
1 pouch for pistol-cartridges.
2 cartridge-loops for carbine-cartridges.
1 pistol-holster.
1 saber-knot.
1 carbine-sling.
1 carbine-sling swivel.
1 canteen.

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Further, the board is of the opinion that the following articles for the cavalry service should be furnished only when especially called for on requisition, namely:

Saddle-cloth, felt.
Halter-chain.
Sweat-leathers.
Stirrup with socket for standard or guidon.
Forage-sack.
Haversack for dismounted service.

RESOLUTION No. 18.

The board recommends the adoption of the changes, alterations, and additions to the horse-equipments, cavalry-equipments, accouterments, and supply-table of tools and materials for the cavalry service as set forth in the resolutions agreed upon and forming part of these proceedings.

In arriving at its conclusions, the board has given due weight to the opinions of cavalry officers received, and have coincided with the views of the majority, excepting where reasons which appear good and convincing have induced it to take other action.

Most of the saddle-trees now on hand were furnished by contractors during the war, and show a great want of uniformity in their measurements and dimensions, and often differ widely from the official gauges. In order to remedy this and prevent injury to horses, the board have selected a model, and recommend that a thorough inspection be made with a view to the condemnation of all trees improperly constructed.

A large number advocate the cincha-strap fastening for the girth, but the board recommends the buckle-fastening, with the modification of a ring instead of the D-ring upon the left side of the girth-strap, so that the cincha-strap can be used when circumstances may render it especially advisable. The board believes that the saddle can be secured with the buckle-fastening as safely and more expeditiously than with any other method, and without the instruction and experience necessary with the cincha-strap.

Many express themselves in favor of the hair girth, but statements made to the board show that the material will be difficult to obtain and expensive in many parts of the country.

Nearly all of the cavalry officers heard from have asked for some modification of the curb-bit now in service, chiefly on account of its great weight. After examining many patterns, the board has selected the model submitted by Capt. W. R. Shoemaker, O. S. K., of the Ordnance Department, as the curb-bit which appears to be the most meritorious and the best adapted to the cavalry service. In weight it is seven ounces lighter than the modified curb-bit issued under General Orders No. 60, War Department, series 1872.

The pouch for carrying carbine and pistol ammunition is approved by the board, a majority of cavalry officers being decidedly in favor of this method as compared to any of the experimental cartridge-boxes issued for trial. By no other box can so large a number of cartridges be carried in the same space, but, in consideration of the peculiar wants of the cavalry on the plains, in long expeditions against the Indians, the board have recommended the addition of the cartridge-loops, to be used with or without the pouch, so arranged as to distribute the weight of a large amount of ammunition as equally as possible upon the belt. These have been tested for a long time upon the frontier, and are used now by many in that locality.

A graduated felt saddle-cloth is recommended to be issued in addition to the blanket as a further protection to the horse's back, especially needed in long marches, when the animals become low in flesh and where the blanket alone is insufficient to prevent sores. An examination of reports made during the war and since, upon this subject, received from the Ordnance-Office, shows a very favorable result, the felt cloth having been used under trying circumstances with beneficial effect.

The cavalry-forge and tool-chest, prescribed by General Orders No. 60, War Department, series of 1872, was carefully examined and its working qualities tested.

It is the opinion of the board that for a forge intended to be carried on pack-animals it is as good as any that could be devised, but the board believes the forge and tools to be too small for the general blacksmiths' work often required in companies on the plains, and that it is not necessary to furnish forges with a view to packing them on animals.

Cavalry leaving the garrison for a scout usually carry fitted shoes with each trooper sufficient for all wants, and forges are only needed in garrison, established camps, or with trains. Heretofore the forge, tools, and materials, both of blacksmiths and saddlers, have been carried in separate boxes, and no provision has been made for their safe-keeping or transportation.

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To supply a want long felt in the cavalry service, the board recommends the cavalry forge-cart of the pattern submitted, with forge, tools, and materials compactly arranged and drawn by two animals, one in shafts and the other by the side in harness, after the method long in use in the Prussian army.

In conclusion, a personal examination has convinced the board of the superior quality of the manufacture and material of the articles furnished from the Government workshops over those obtained by contract, and it is earnestly recommended that, as far as possible, all stores issued to the cavalry by the Ordnance Department may be made in the arsenals, believing that to be for the best interests of the service.

[First indorsement.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, May 8, 1874.

Respectfully referred to the Acting Chief of Ordnance for remark.

E. D. TOWNSEND,
Adjutant-General.

[Second indorsement.]

ORDNANCE-OFFICE, *May* 11, 1874.

Respectfully returned to the Adjutant-General.

The recommendations of the board are concurred in, but in carrying out the changes, alterations, and additions recommended, it is suggested that the large quantity of stores on hand of old patterns be utilized, and the changes, &c., be made as rapidly as a due regard to economy will permit.

S. V. BENÉT,
Acting Chief of Ordnance.

[Third indorsement.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, May 13, 1874.

Respectfully referred to the General of the Army before being submitted to the Secretary of War.

E. D. TOWNSEND,
Adjutant-General.

[Fourth indorsement.]

HEADQUARTERS OF THE ARMY,
Washington, D. C., May 15, 1874.

I hardly feel competent to pass judgment on the matter of cavalry equipment, and would be governed by the opinions of the cavalry officers who serve on the plains and have abundant experience. The present stock on hand could be exhausted gradually, leaving the new equipment to accumulate in store, ready for emergency, or for use after the present supply is exhausted.

W. T. SHERMAN, *General.*

[Fifth indorsement.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, May 16, 1874.

Respectfully submitted to the Secretary of War.

E. D. TOWNSEND,
Adjutant-General.

[Sixth indorsement.]

MAY 20, 1874.

The Secretary of War concurs with the General of the Army and the Chief of Ordnance, that the stores on hand of old patterns should be utilized before issue of new patterns. In regard to horseshoes, however, an immediate issue is authorized of the two styles recommended by the board.

By order of the Secretary of War.

H. T. CROSBY, *Chief Clerk.*

[Seventh indorsement]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, May 21, 1874.

Respectfully returned to the Acting Chief of Ordnance, inviting attention to the action of the Secretary of War indorsed hereon.

The General of the Army has been advised accordingly.

E. D. TOWNSEND,
Adjutant-General.

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APPENDIXES AND ABSTRACTS.

APPENDIX I.

List of experimental cartridge-boxes, submitted to the board on cavalry-equipments by the commanding officer of the Leavenworth Arsenal, pursuant to instructions of the Chief of Ordnance of the United States Army, of December 24, 1873:

1 cartridge-box, A.
1 cartridge-box, B.
1 cartridge-box, D.
1 cartridge-box, F, with tin cartridge-holder.
1 cartridge-box, F, with wooden cartridge-holder.
1 cartridge-box, K.
1 cartridge-box, M, No. 1.
1 cartridge-box, M, No. 2.
1 cartridge-box, N.
1 cartridge-box, P.
1 cartridge-pouch, C.
1 cartridge-pouch, L. (Had originally a fastening like F; admits of any variety.)
1 cartridge-pouch, E.
1 cartridge-vest, H, pair, four rows of loops.

A. MORDECAI,
Captain of Ordnance, Commanding.

LEAVENWORTH ARSENAL, KANS., *January* 10, 1874.

APPENDIX II.

List of supplies furnished by the Ordnance Department for the use of the cavalry, submitted to the board on cavalry-equipments by the commanding officer of the Leavenworth Arsenal, pursuant to instructions of the Chief of Ordnance, United States Army, of December 16, 1873:

One set of horse-equipments, standard pattern, as per Ordnance Memoranda No. 13, consisting of—

1 saddle, cavalry, leather-covered, complete.
1 bridle, curb, with bit, No. 1.
1 bridle, watering.
1 halter and strap.
1 pair saddle-bags, (linen duck.)
1 surcingle.
1 brush and shoe pouch.
1 forage-sack.
1 side-line.
1 saddle-cloth.
1 pair spurs.
1 pair spur-straps.
1 ration or coffee can.
3 bits, extra, Nos. 2, 3, and 4.

One set of cavalry-accouterments, altered, standard pattern, as per Ordnance Memoranda, No. 13, consisting of—

1 carbine-cartridge pouch.
1 pistol-cartridge pouch.
1 pistol-holster, (breech-loading pistol, cal. .50,) swivel attachment.
1 saber-belt, cavalry.
1 saber-belt plate, (U. S.)
1 pair saber-slings, with hooks.
1 carbine-sling and swivel.
1 saber-knot.

Three sets of cavalry-equipments, brace system, consisting of—

2 braces, No. 1.
1 brace, No. 2.

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2 saber-belts and plates, No. 1.
1 saber-belt and plate, No. 2.
1 cartridge-box, No. 1.
1 cartridge-box, No. 2.
1 cartridge-pouch.
3 catridge-pouches, pistol.
3 pistol-holsters.
3 sword-knots.
3 carbine-swivels.

One cavalry forge, with tools and materials, consisting of—

1 forge-chest.
1 tool-chest.
1 bucket, iron.
1 anvil and block.
1 vise.
1 tongs.
1 poker.
1 fire-shovel.
1 rake, fire.
1 apron, smiths'.
1 die-stock, with two taps and two pairs dies.
1 box, shoeing.
1 rasp, smiths'.
1 hammer, hand.
1 hammer, shoeing.
1 hammer, riveting.
1 hammer, nail.
1 chisel, splitting.
1 pritchel.
1 hardy.
1 caliper.
1 clinching-iron.
1 knife, shoeing.
1 knife, toe.
1 punch, fore.
1 creaser.
1 buttress.
1 wrench-screw.
2 nail-bags.
1 oil-can with oil.
3 files.
1 pincers, shoeing.
1 square, steel.
1 punch, nail.
10 pounds nails, horseshoe.
1 tool-bag, for saddlers' and smiths' tools.

One set of saddlers' tools, consisting of—

9 awls, assorted, without handles.
3 awls, assorted, with handles.
1 awl, pad or seat, handled.
2 peg or stub awls, with patent handles.
1 stitching-awl handle, patent.
1 claw-tool.
1 creaser, lignum-vitæ.
1 compasses, common.
2 edge-tools, Nos. 1 and 2.
1 gauge-knife, draw.
1 hammer, riveting.
1 hammer, saddlers'.
1 knife, shoe.
1 knife, half-round, 5-inch.
1 knife-head.
1 knife, splitting, 6-inch.
1 mallet, half-pound head.
3 papers of needles, Nos. 4, 5, and 6.
1 paper of needles for patent thread, Glover's, No. 5.

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1 nippers, cutting.
1 oil-stone.
1 pricking-carriage, with three wheels, Nos. 8, 10, and 12.
1 punch, spring, Nos. 4 and 7.
1 punch, hand, No. 8.
1 pliers.
1 rule, two-foot.
1 pair rivet-sets, (one center, one heading.)
1 shears, 6-inch blade.
1 slicker, steel, wooden handle.
1 screw-driver, 3-inch.
1 thimble.

Smiths' tools, &c.

10 horseshoes, Nos. 2 and 3.
3 pounds horseshoe-nails.
1 hammer, shoeing.
1 pincers, shoeing.
1 rasp.
1 pritchel.
1 nail-punch and clinch-knife.
1 toe and shoeing knife.
1 clinching-iron.
1 apron, leather.

Materials.

1 ball shoe-thread, dark-blue, No. 3.
1 ball shoe-thread, white, No. 3.
1 ball shoe-thread, white, No. 10.
1 spool patent linen thread, 3-cord, No. 50.
1 paper tacks, (1,000,) 6-ounce.
1 paper tacks, (1,000,) 12-ounce.
1 ounce beeswax.
¼ pound black wax.
3 pounds harness-leather, strap.

Pertaining to a six months' supply.

1 pound shoe-thread, white, No. 10.
1 pound shoe-thread, white, No. 3.
1 pound shoe-thread, dark-blue, No. 3.
¼ pound patent linen thread, 3-cord, one ball yellow.
¼ pound patent linen thread, 3-cord, one ball orange.
¼ pound patent linen thread, 3-cord, one ball black.
¼ pound patent linen thread, 3-cord, one ball white.
2 ounces patent linen thread, 3-cord, one spool white, No. 50.
2 ounces patent linen thread, 3-cord, one spool blue, No. 35.
2 ounces patent linen thread, 3-cord, one spool black, No. 35.
2 ounces patent linen thread, 3-cord, one spool red, No. 35.
2 papers (1,000) iron tacks, 6-ounce.
2 papers (1,000) iron tacks, 12-ounce.
¼ pound beeswax.
2 pounds black wax.
1 side of bridle-leather.
15 pounds harness-leather, (one side.)
8 pounds collar-leather, (one side.)
1 pound copper rivets and burrs, ½-inch, No. 10.
1 pound copper rivets and burrs, ¾-inch, No. 12.
592 pounds horseshoes, Burden's No. 2.
695 pounds horseshoes, Burden's No. 3.
25 pounds horseshoe-nails, Ausable No. 7.
35 pounds horseshoe-nails, Ausable No. 8.

Horse-equipments, pattern 1859.

1 saddle, raw-hide-covered, No. 1, 11-inch seat.
1 saddle, raw-hide-covered, No. 2. 11½-inch seat.
1 saddle, raw-hide-covered, No. 3. 12-inch seat.
1 pair stirrups, wood, with hood.

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1 pair stirrup-leathers.
6 coat-straps.
1 carbine-socket.
1 girth, 4½-inch, woolen webbing, blue.
1 curb-bridle, headstall, and reins, with curb-bit No. 4, curb-chain and safe.
1 curb-bit, No. 3.
1 curb-bit, No. 2.
1 curb-bit, No. 1, 4-inch diameter of ring.
1 curb-bit, No. 1, 3¾-inch diameter of ring.
1 watering-bridle, bit, and reins.
1 halter and strap.
1 pair saddle-bags, leather.
1 saddle-blanket, blue.
1 surcingle, 3-inch, woolen webbing, blue.
1 pair spurs, rough finish.
1 pair spur-straps.
1 curry-comb.
1 horse-brush.
1 picket-pin.
1 lariat.
1 nose-bag.

Cavalry-accouterments.

1 saber-belt and plate, with two slings and shoulder-belt, grained leather.
1 saber-belt and plate, with two slings and shoulder-belt, buff leather.
1 carbine-cartridge pouch, Dyer's.
1 carbine-cartridge pouch-sling, Dyer's.
1 carbine-cartridge pouch-sling swivel.
1 carbine-cartridge box, Sharp's.
1 carbine-sling, grained leather.
1 carbine-sling, buff leather.
1 carbine-sling swivel.
1 pistol-belt holster.
1 pistol-cartridge pouch.
1 saber-knot, grained leather.
1 saber-knot, buff leather.
1 saber-belt and plate, with Stuart's attachment.
1 side-line leglet, with lining.
1 side-line leglet, plain strap, chain 25½ inches long.
1 side-line leglet, plain strap, chain 28½ inches long.
1 side-line leglet, plain strap, chain 31 inches long.
3 lariats, extra, different sizes and materials.
1 pair stirrups, wood, without hood.
1 pair sweat-leathers.
1 saddle, leather-covered, complete, converted at the Leavenworth Arsenal; differs from the standard in size of safes to D-rings and in welts on cantle and pommel.
1 cartridge-box, M pair, with shoulder-straps.
1 cartridge-vest, H, three rows of loops.
1 cartridge-pouch, L, with turn-buckle.
1 haversack, painted canvas.
1 haversack, enameled cloth.
1 canteen and strap.
4 pairs saddler-clamps, different patterns.
1 saddlers' horse.
1 saddlers' tool-box.
1 saddlers' tool-pouch.
1 bit, nickel-plated, experimental.
1 saddle-cloth, experimental.
6 pounds Collins's prepared harness-oil.

Sample patterns.

2 horseshoes, fore, Burden's No. 1.
2 horseshoes, hind, Burden's, No. 1.
2 horseshoes, fore, Burden's, No. 2.
2 horseshoes, hind, Burden's, No. 2.
2 horseshoes, fore, Burden's, No. 3.
2 horseshoes, hind, Burden's, No. 3.
2 horseshoes, fore, Burden's, No. 4.
2 horseshoes, hind, Burden's, No. 4.

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2 horseshoes, fore, Burden's, No. 5.
2 horseshoes, hind, Burden's, No. 5.
2 horseshoes, fore, Rhode Island, No. 2.
2 horseshoes, hind, Rhode Island, No. 2.
2 horseshoes, fore, Rhode Island, No. 3.
2 horseshoes, hind, Rhode Island, No. 3.
2 horseshoes, fore, Rhode Island, No. 4.
2 horseshoes, hind, Rhode Island, No. 4.
2 horseshoes, fore, Corning & Winslow, No. 3.
2 horseshoes, hind, Corning & Winslow, No. 3.
2 horseshoes, fore, Juniata, No. 3.
2 horseshoes, hind, Juniata, No. 3.
2 horseshoes, fore, Colwell, No. 3.
2 horseshoes, hind, Colwell, No. 3.
2 horseshoes, fore, Unknown, No. 3.
2 horseshoes, hind, Unknown, No, 3.
2 horseshoes, fore, Burden's, No. 3, fitted.
2 horseshoes, hind, Burden's No. 3, fitted.
1 pound horseshoe-nails, Globe, bright, No. 6.
1 pound horseshoe-nails, Globe, bright, No. 7.
1 pound horseshoe-nails, Globe, bright, No. 8.
1 pound horseshoe-nails, Globe, bright, No. 9.
1 pound horseshoe-nails, Ausable, No. 6.
1 pound horseshoe-nails, Ausable, No. 7.
1 pound horseshoe-nails, Ausable, No. 8.
1 pound horseshoe-nails, Ausable, No. 9.
1 pound horseshoe-nails, rusty.

Specimens.

10 rasps, different patterns.
3 shoeing-knives, different patterns.
6 clinching-irons, different patterns.
1 slicker, glass.
1 slicker, glass, with wooden handle.
1 slicker, wood.

A. MORDECAI,
Captain of Ordnance, Commanding.

LEAVENWORTH ARSENAL, *January* 10, 1874.

APPENDIX III.

List of patterns submitted to the board on cavalry-equipments, not shown in Appendix I and Appendix II:

3 samples officers' sabers, from Ordnance-Office.
1 cartridge-box, patented by Lieutenant McKeever, from Ordnance-Office.
1 scouting-belt, with loops, from Captain Bernard, First Cavalry.
2 waist-belts and plates, with loops, from Colonel Mordecai, Ordnance Department.
1 scouting-belt, with loops, from Capt. E. B. Wells, Second Cavalry.
3 bridles, made by James H. Wilson, Nashville, from Ordnance-Office.
1 watering-bridle, from Ordnance-Office.
1 bridle, from Ordnance-Office.
1 model of curb-bit, from Captain Spaulding, Second Cavalry.
1 drawing of curb-bit, from Major DuBois, Third Cavalry.
2 models of curb-bit, from Capt. W. R. Shoemaker, M. S. K. O.
1 drawing of curb-bit, from Capt. H. E. Noyes, Second Cavalry.
1 pair of hopples, Colonel Palmer's, from Ordnance-Office.
1 pair of side-lines, Colonel Palmer's, from Ordnance-Office.
1 pair of side-lines, from Major Merrill, Seventh Cavalry.
1 pair of side-lines, from Col. N. A. Miles, Fifth Infantry.
1 pair of side-lines, from Ordnance-Office.
1 pair of side-lines, from Colonel Mordecai, made by request of board.
2 pairs of side-lines, from Colonel Mordecai.
1 picket-pin, from William Lyons.
1 picket-pin, from Captain Spaulding, Second Cavalry.
1 picket-pin, from Capt. H. E. Noyes, Second Cavalry.
1 picket-pin, from Lieut. W. C. Rawolle, Second Cavalry.
1 model of picket-pin, from Capt. C. B. McLellan, Sixth Cavalry.

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1 sweat-leather, model from Captain Spaulding, Second Cavalry.
1 lariat, from Major Merrill, Seventh Cavalry.
1 lariat, from Captain H. E. Noyes, Second Cavalry.
1 hair lariat, from Colonel Mordecai, Ordnance Department.
1 cavalry carrying-braces, from Lieut. George H. Palmer, Sixteenth Infantry.
1 drawing of Kiernan's horseshoe, from Col. B. H. Grierson, Tenth Cavalry.
2 curry-combs, from Major Merrill, Seventh Cavalry.
1 curry-comb, No. 18, from Colonel Mordecai, Ordnance Department.
1 curry-comb, No. 480, from Colonel Mordecai, Ordnance Department.
1 horse-brush, No. 101, from Colonel Mordecai, Ordnance Department.
1 horse-brush, No. 401, from Colonel Mordecai, Ordnance Department.
1 felt saddle-cloth, gray, from Colonel Mordecai, Ordnance Department.
1 felt saddle-cloth, gray, bound yellow, from Colonel Mordecai, Ordnance Department.
1 felt saddle-cloth, blue, bound yellow, from Colonel Mordecai, Ordnance Department.
1 felt saddle-cloth, blue, from Colonel Mordecai, Ordnance Department.
1 pistol-holster, from Capt. H. E. Noyes, Second Cavalry.
2 hair cinchas, from Colonel Mordecai, Ordnance Department,
1 pair of saddle-bags, from Colonel Mordecai, Ordnance Department.
1 pair of California saddle-bags, from Colonel Mordecai, Ordnance Department.
2 pairs of back-straps, from Colonel Mordecai, Ordnance Department.
4 cincha-straps, from Colonel Mordecai, Ordnance Department.
1 Wait's feed-bag, from Colonel Mordecai, Ordnance Department.
1 feed-bag from American Horse-Feeder Company, from Ordnance-Office.
1 Homes's belly-band fastener, from Ordnance-Office.
1 G. W. Barnes's pulley bridle-bit, from Ordnance-Office.
1 Hazen's cartridge-belt, No. 1, single row of loops, from Colonel Mordecai.
1 Hazen's cartridge-belt, No. 2, double row of loops, from Colonel Mordecai.

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ABSTRACT A.—*Abstract of recommendations by cavalry officers upon the subject of the saddlers' and blacksmiths' tools and the supply-table for materials, contained in reports to the Chief of Ordnance, referred to the Board on Cavalry-Equipments, in the communication dated December 24, 1873, appended to proceedings and marked Appendix No. 1.*

Names of officers.	Regiment.	Station.	Date.	Changes recommended in supplies, differing from the allowances laid down in General Orders No. 60, Adjutant-General's Office, series 1872.							
				Saddlers' tools.							
				Handles for awls, assorted.	Awl-handles.	Awl-handles, patent.	Claw-tools.	Creasers, lignum-vitæ.	Edge-tools.	Knives, shoe.	Needles, papers of.
Col. J. J. Reynolds	Third Cavalry, commanding	Fort McPherson, Nebr	Apr. 15, 1873	6	4	5	3	4	(*)	3	(†)
Col. James Oakes	Sixth Cavalry, commanding	Fort Riley, Kans	Apr. 8, 1873	.....	.....	.....	.....	.....	.....	.....	.....
Lieut. Col. E. A. Carr	Fifth Cavalry, commanding	Camp Lowell, Ariz	June 6, 1873	.....	.....	2	.....	2	.....	2	.....
Lieut. Col. J. W. Davidson	Tenth Cavalry, commanding	Fort Sill, Ind. T	June 5, 1873	.....	.....	.....	.....	.....	.....	.....	.....
Col. J. Irwin Gregg	Eighth Cavalry, commanding	Fort Union, N. Mex	Apr. 4, 1873	.....	.....	.....	.....	.....	.....	.....	.....
Col. Edwin Hatch	Ninth Cavalry, commanding	Ringgold Barracks	Apr. 30, 1873	.....	.....	.....	.....	.....	.....	.....	.....
Capt. Clarence Mauck	Fourth Cavalry	Fort Clark, Tex	Apr. 16, 1873	.....	.....	.....	.....	.....	.....	.....	.....
Capt. A. E. Bates	Second Cavalry	West Point, N. Y	Mar. 25, 1873	.....	.....	.....	.....	.....	.....	.....	.....

* Two of No. 1, two of No. 2, and four of No. 4.

† Three of No. 4, three of No. 5, three of No. 6, six of Nos. 2 and 3.

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ABSTRACT A.—*Abstract of recommendations by cavalry officers, &c.*—Continued.

Names of officers.	Changes recommended in supplies differing from the allowances laid down in General Orders No. 60, Adjutant-General's Office, series 1872. Saddlers' tools. Needles for patent thread, papers of.	Oilstones.	Pricking-carriage with wheels.	Punches, spring.	Punches, hand.	Pliers, pairs.	Slicker, glass.	Screw-driver.	Collar-palm and needle.	French edge-tool, No. 3.	French edge-tool, Nos. 4 and 6.	Patent-leather gauge.	Patent-leather compasses.	Rounding-machine, three holes.	Stitching-horse.	Chandling-tool.	Rounding-iron.	Splitting-gauge.	Gauge-knife for rounds.
Col. J. J. Reynolds	(*)	3	(†)	(‡)	(§)	3	1	(‖)	1	1	2	1	1	1	1	1	1	1	1
Col. James Oakes	.....	...	.....	...	.....	...	...	...	...	...	...	...	.....	...	...	...	...	...	...
Lieut. Col. E. A. Carr	.....	...	.....	...	(¶)	...	...	...	...	...	...	...	1	...	...	...	...	...	...
Lieut. Col. J. W. Davidson	.....	...	.....	...	.....	...	...	...	...	...	...	...	.....	...	...	...	...	...	...
Col. J. Irwin Gregg	.....	...	.....	...	.....	...	...	...	...	...	...	...	.....	...	...	...	...	...	...
Col. Edwin Hatch	.....	...	.....	...	.....	...	...	...	...	...	...	...	.....	...	...	...	...	...	...
Capt. Clarence Mauck	.....	...	.....	...	.....	...	...	...	...	...	...	...	.....	...	...	...	...	...	...
Capt. A. E. Bates	.....	...	.....	...	.....	...	...	...	...	...	...	...	.....	...	...	...	...	...	...

* One of No. 5 and one of No. 3.
§ One of Nos. 4 to 7, one of Nos. 9 to 12.
† One each of 6 to 18.
‖ One 3-inch, one 6-inch.
‡ Four of 1, 2, 3, and 5.
¶ One of No. 6.

ABSTRACT A.—*Abstract of recommendations by cavalry officers, &c.*—Continued.

Names of officers.	Changes recommended in supplies differing from the allowances laid down in General Orders No. 60, Adjutant-General's Office, series 1872. Saddlers' tools. Spring-punch with six assorted nipples.	Awls, pad or seat.	Hammers, saddlers', with claw.	Sandstone.	Rules, patent.	Tacks.	Saddlers' materials. Beeswax, pounds of.	Black wax, pounds of.	Emery cloth, sheets.	Sweet-oil, gallons.	Emery, pounds of.	Needles for patent thread, papers of.	Copper rivets and burrs, pounds of.	Neat's-foot oil, gallons.	Patent-leather thread, pounds of.	Oil-can.	Roller-buckles.
Col. J. J. Reynolds	1	...	.....	...	...	(*)	1½	1	...	...	...	.....	(†)	...	2	1	(‡)
Col. James Oakes	.....	...	.....	...	...	.....	...	...	125	2	5	.....	5	5½	.....	...	...
Lieut. Col. E. A. Carr	.....	2	1	1	1	...	...	...	...	...	...	2	.....	...	.....	...	...
Lieut. Col. J. W. Davidson	.....	...	.....	...	...	...	...	...	...	...	...	.....	.....	...	.....	...	...
Col. J. Irwin Gregg	.....	...	.....	...	...	...	...	...	...	...	...	.....	.....	...	.....	...	...
Col. Edwin Hatch	.....	...	.....	...	...	...	...	...	120	...	...	.....	.....	5	.....	...	...
Capt. Clarence Mauck	.....	...	.....	...	...	...	...	...	...	...	...	.....	10	...	.....	...	...
Capt. A. E. Bates	.....	...	.....	...	...	...	...	...	...	...	...	.....	.....	...	.....	...	...

* Three thousand of Nos. 6 and 12; five thousand of No. 18. † Five pounds, assorted. ‡ One hundred and fifty, assorted.

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ABSTRACT A.—*Abstract of recommendations by cavalry officers, &c.*—Continued.

Names of officers.	Changes recommended in supplies differing from the allowance laid down in General Orders No. 60, Adjutant-General's Office, series 1872.																
	Saddlers' materials.										Smiths' tools.						
	Horseshoe-buckles.	Girth-rings.	Webbing, blue, 3-inch.	Halter-rings, squares, and bars.	Carver.	Bar-buckles, iron.	Half-round buckles, ⅝-inch.	Bridle-leather, pounds of.	Harness-leather, pounds of.	Collar-leather, pounds of.	Shoeing-hammers.	Shoeing-pincers.	Shoeing-rasps.	Pritchels.	Toe-knives.	Leather aprons.	Three-cornered files.	Small vise.
Col. J. J. Reynolds	(*)	(*)	13	100	1	50	75	40	65	.....	3	3	19	3	3	3	3	1
Col. James Oakes	...	...	(*)	.....	...	...	.....	100	100	35	...	...	...	...	...	...	...	...
Lieut. Col. E. A. Carr	...	...	...	24	...	24	24	25	50	.....	...	...	...	...	...	...	...	...
Lieut. Col. J. W. Davidson	...	...	...	.....	...	...	.....	20	30	.....	...	...	...	...	...	...	...	...
Col. J. Irwin Gregg	...	...	...	.....	...	...	.....	50	100	.....	...	...	...	...	...	...	...	...
Col. Edwin Hatch	...	...	...	.....	...	...	.....	25	60	.....	...	...	...	...	...	...	...	...
Capt. Clarence Mauck	...	...	...	.....	...	...	.....	25	.....	.....	...	...	...	...	...	...	...	...
Capt. A. E. Bates	...	...	...	.....	...	...	.....	.....	.....	.....	...	...	...	...	...	...	...	...

* Sufficient quantity. † Yards.

ABSTRACT A.—*Abstract of recommendations by cavalry officers, &c.*—Concluded.

Names of officers.	Changes recommended in supplies differing from the allowances laid down in General Orders No. 60, Adjutant-General's Office, series 1872.							Remarks.
	Smiths' tools.					Smiths' materials.		
	Hand-hammer.	Farriers' knives.	Tongs, pairs.	Tongs, clinching, pairs.	Half-round hardy.	Horseshoes, Nos. 2 and 3, pounds of.	Horseshoe-nails, pounds of.	
Col. J. J. Reynolds	1	2	2	2	1	1,500	90	
Col. James Oakes	...	...	...	...	...	.....	.....	Thinks that the entire supply should be regulated by the exigencies of the service alone and not by any fixed allowance.
Lieut. Col. E. A. Carr	...	...	...	...	...	.....	.....	
Lieut. Col. J. W. Davidson	...	...	...	...	...	.....	.....	Thinks the present allowance of tools sufficient.
Col. J. Irwin Gregg	...	...	...	...	...	.....	.....	
Col. Edwin Hatch	...	...	...	...	...	.....	.....	Recommends that lard-oil, lamp-black, tripoli, and assorted buckles be added to the supply-table.
Capt. Clarence Mauck	...	...	...	...	...	.....	.....	Reports present allowance of leather entirely insufficient.
Capt. A. E. Bates	...	...	...	...	...	.....	.....	Recommends the issue of additional straps and halters to save expenditure of leather.

L. H. CARPENTER,
Captain Tenth Cavalry, Brevet Colonel,
Recorder of Board on Cavalry Equipments.

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ABSTRACT B.—*Summary of the contents of certain letters referred to the Board on Cavalry-Equipments, in the communication from the Ordnance Depatment dated December 24, 1873, marked Appendix No. 1.*

1. Letter from Maj. R. I. Dodge, Third Infantry, commanding Fort Dodge, Kansas, (5885 of 1873,) dated November 3, 1873, transmits reports of scouts of Companies F and G, Sixth Cavalry, with criticisms on arms and equipments.

[Inclosure 1 to letter 5885 of 1873.]

Joseph Kerin, captain Sixth Cavalry, commanding Company F, October 6, 1873, reports scouts made by Company F, Sixth Cavalry, from April 28, 1873, to October 6, 1873.

[Extracts from remarks therein.]

* * The new cavalry-equipments were first worn by men of the company on scouting duty, on the scout of June 25 to July 14, 1873. Lieutenant Henely, in charge of this scouting party, on the same, dated July 14, says: "The men of the detachment disliked very much the new belts and carbine-slings furnished them recently; they complain that they are cumbersome, are composed of so much leather as to make them feel exceedingly warm, and chafed the shoulders to such an extent, in many instances, that they cannot be worn at all."

[Inclosure 2 to letter 5885 of 1873.]

T. C. Tupper, captain Sixth Cavalry, commanding Company G, Sixth Cavalry, October, 1873, reports scouts made by Company G, Sixth Cavalry, from March 13, 1873, to October, 1873.

[Extracts from remarks therein.]

* * * The carbine-sling belt in use is satisfactory; the cartridge-boxes are unfit for field use. I recommend the cartridge-pouch lined with sheep-skin. The leather-covered saddles are the best I have seen in use in the service. * * * The bridle-bits now in use I consider outrageous; they are uniformly too heavy. * * * I recommend the Daniels steel-bit, with curb-straps in place of curb-chain. * * *

2. Letter from J. T. Morrison, first lieutenant Tenth Cavalry, (No. 5736 of 1873,) dated October 24, 1873, requests that certain blankets advertised to be sold be withdrawn from sale and issued as horse-covers, there being none for issue.

The original documents returned, by request, to Chief of Ordnance.

L. H. CARPENTER,
Capt. Tenth Cav., Brt. Col., Recorder of Board on Cavalry-Equipments.

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ABSTRACT C.—*Abstract of opinions of cavalry officers on the cavalry-equipments, experimental.*

Number.	Names of officers.	Rank.	Company.	Regiment.	Station.	Braces, experimental.		Holster-attachment, experimental.		Saber-slings, experimental.		Pistol-cartridge pouch, present pattern.		Which cartridge-box preferred for field.	Which cartridge-box preferred for garrison.	Separate sling for carbine.		Nose-bags.		Number of times the cavalry equipments were in actual service.
						In favor of.	Against.	In favor of.	Against.	In favor of.	Against.	In favor of.	Against.			In favor of.	Against.	In favor of.	Against.	
1	Henry Wagner	Captain	C	First Cavalry	Camp McDermit, Nev	....	....	....	....	....	....	....	1	Box No. 1	Box No. 1	....	1	....	1	29
2	R. F. Bernard	....do	G	....do	Camp Bidwell, Cal	....	....	....	....	....	....	....	....	Box No. 2	Box No. 2	....	....	....	1	13
3	F. K. Upham	Lieutenant	L	....do	Camp Apache, Ariz	....	1	....	1	1	....	....	....	Box No. 1	Box No. 1	1	....	....	1	70
4	Moses Harris	Captain	M	....do	Fort Walla-Walla, Wash	....	1	....	1	1	....	....	....	.....	....do	1	....	....	....	133
5	Thomas B. Dewees	....do	A	Second Cavalry	Medicine Bow, Wyo	....	1	1	....	....	1	1	....	Pouch.	Pouch	1	....	....	....	16
6	E. R. Wells	....do	E	....do	Fort Laramie, Wyo	....	1	....	1	1	....	....	1	....do	Box No. 2	1	....	1	....	120
7	H. E. Noyes	....do	I	....do	Fort Sanders, Wyo	....	1	....	1	....	....	....	....	Belt	.....	1	....	....	1	3
8	John Mix	....do	M	....do	Omaha Barracks, Nebr	....	1	....	1	1	....	....	1	Pouch	Box No. 1	1	....	1	....	184
9	William Hawley	....do	A	Third Cavalry	Sidney Barracks, Nebr	....	1	1	....	....	1	....	....	Belt	Box No. 2	1	....	....	1	16
10	John P. Walker	First Lieut.	A	....do	....do	1	....	....	....	1	....	....	....	Pouch	Box No. 1	....	1	1	....	13
11	Charles Meinhold	Captain	B	....do	Fort McPherson, Nebr	....	1	....	1	1	....	....	1	Belt	Box No. 2	1	....	1	....	66
12	F. Van Vliet	....do	C	....do	Fort Fetterman, Wyo	....	1	....	1	....	1	1	....	....do	Box No. 1	1	....	....	....	.....
13	P. D. Vroom	First Lieut.	C	....do	....do	....	....	....	....	....	....	1	....	.....	.....	1	....	....	....	.....
14	Guy V. Henry	Captain	D	....do	Laramie River, Wyo	....	1	....	1	....	1	....	1	Belt	Belt	1	....	1	....	60
15	Deane Monahan	....do	G	....do	Fort D. A. Russell, Wyo	....	1	....	....	1	....	....	1	....do	Box No. 1	1	....	....	1	14
16	A. D. King	First Lieut.	I	....do	Fort McPherson, Nebr.	....	1	....	....	....	....	....	....	Box No. 2	Box No. 2	1	....	....	1	20
17	Clarence Mauck	Captain	B	Fourth Cavalry	Fort Clark, Tex	....	1	....	1	....	1	....	....	.....	.....	1	....	1	....	.....
18	D. Madden	....do	C	....do	Camp near Wichita, Kans	1	....	1	....	1	....	....	1	Pouch	Pouch	1	....	1	....	.
19	William O'Connell	....do	M	....do	Fort Duncan, Tex	....	1	....	1	....	1	....	1	....do	.....	....	....	....	1	88
20	C. E. Nesmith	....do	A	Sixth Cavalry	Camp Borthwick	....	4	....	1	....	1	1	....	....do	Box No. 1	1	....	1	....	10
21	S. M. Whitside	....do	B	....do	Fort Hays, Kans	....	1	....	1	....	1	....	....	....do	Pouch.	1	....	1	....	20
22	C. G. Gordon	First Lieut.	E	....do	Fort Gibson, Ind. T	....	1	....	1	....	1	1	....	....do	Box No. 1	1	....	1	....	145
23	Joseph Kerin	Captain	F	....do	Fort Dodge, Kans	....	1	....	1	....	1	....	....	....do	....do	1	....	....	1	77
24	W. M. Wallace	First Lieut.	H	....do	....do	....	1	1	....	1	....	1	....	....do	Box No. 2	1	....	1	....	84
25	A. R. Chaffee	Captain	I	....do	Camp Supply, Ind. T	....	1	1	....	....	....	1	....	....do	Box No. 1	1	....	1	....	60
26	William Harper, jr.	First Lieut.	K	....do	....do	....	1	1	....	....	1	1	....	....do	Pouch	1	....	1	....	20
27	C. B. McLellan	Captain	L	....do	Near Fort Hays, Kans	....	1	....	1	....	1	....	....	....do	....do	1	....	1	....	85
28	V. K. Hart	....do	C	Seventh Cavalry	Fort Rice, Dak	....	1	....	1	....	1	....	1	....do	Box No. 1	1	....	1	....	210
29	F. W. Benteen	....do	H	....do	Camp near Fort Rice, Dak	....	1	....	1	....	1	....	1	....do	Pouch	1	....	1	....	220
30	M. W. Keogh	....do	I	....do	In the field, Dakota	....	1	....	1	....	1	....	1	....do	....do	1	....	1	....	114
31	William McCleave	....do	B	Eighth Cavalry	Pingatoire River, Colo	....	1	....	1	....	1	1	....	Belt	.....	1	....	1	....	37

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ABSTRACT C.—*Abstract of opinions of cavalry officers on the cavalry-equipments, experimental*—Continued.

Number.	Names of officers.	Rank.	Company.	Regiment.	Station.	Braces, experimental.		Holster-attachment, experimental.		Saber-slings, experimental.		Pistol-cartridge pouch, present pattern.		Which cartridge-box preferred for field.	Which cartridge-box preferred for garrison.	Separate sling for carbine.		Nose-bags.		Number of times the cavalry-equipments were in actual service.
						In favor of.	Against.	In favor of.	Against.	In favor of.	Against.	In favor of.	Against.			In favor of.	Against,	In favor of.	Against.	
32	A. P. Caraher	Captain	F	Eighth Cavalry	Fort Garland, Colo	....	1	....	1	....	1	1	....	Pouch	Box No. 1	1	....	1	....	136
33	Charles Hobart	....do	L	....do	Canadian River	....	1	1	....	1	....	1	....	....do	....do	1	....	1	....	112
34	Michael Cooney	....do	A	Ninth Cavalry	Fort Concho, Tex	....	1	....	1	1	....	....	....	Belt	Box No. 2	1	....	....	1	44
35	C. D. Beyer	....do	C	....do	Santa Maria, Tex	....	1	....	1	....	1	1	....	....	....	1	....	....	....	90
36	F. S. Dodge	....do	D	....do	Fort Stockton, Tex	....	1	1	....	1	....	1	....	Pouch	Box No. 1,	1	....	....	1	113
37	J. L. Humfreville	....do	K	....do	Fort Brown, Tex	....	1	....	....	....	1	....	....	....do	Pouch	1	....	....	....	90
38	Nicholas Nolan	....do	A	Tenth Cavalry	Fort Concho, Tex	....	1	....	1	....	1	....	1	Belt	Box No. 1	1	....	....	1	102
39	L. H. Carpenter	....do	H	....do	Fort Sill, Ind. T	....	1	....	1	1	....	1	....	Pouch	....do	1	....	....	1	27
40	T. A. Baldwin	....do	I	....do	Fort Richardson, Tex	....	1	....	1	....	1	1	....	....do	....do	1	....	1	....	30
41	C. H. Carlton	....do	K	....do	Fort Sill, Ind. T	....	1	....	1	1	....	....	....	....do	Pouch	1	....	....	....	33
42	Thomas Little	....do	L	....do	Fort Richardson, Tex	....	1	....	1	....	1	1	....	....do	Box No. 1	1	....	....	1	42
43	S. T. Norvell	....do	M	....do	Fort Sill, Ind. T	....	1	1	....	1	....	1	....	....do	Pouch	1	....	1	....	60
	Summary					2	38	9	27	15	22	18	12			39	2	22	14	2,812

Number of officers in favor of pouch for field-service 26
Number of officers in favor of scouting-belt for field-service 9
Number of officers in favor of box No. 1 for field-service 2
Number of officers in favor of box No. 2 for field-service 2

Number of officers in favor of pouch for garrison-service 10
Number of officers in favor of belt for garrison-service 1
Number of officers in favor of box No. 1 for garrison-service 19
Number of officers in favor of box No. 2 for garrison-service 7

The original papers referred to in this abstract were returned, by request, to the Chief of Ordnance.

L. H. CARPENTER,
Captain Tenth Cavalry, Brevet Colonel, Recorder of the Board on Cavalry-Equipments.

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ABSTRACT D.—*Abstract of reports of officers upon the experimental cartridge-boxes issued for trial.*

Names of officers.	Rank.	Company.	Regiment.	Station.	What kind of cartridge box or pouch in actual use.	What kind of cartridge box or pouch preferred.	Time the cartridge-boxes reported upon were in actual service.
Thomas McGregor	Captain	A	First Cavalry	Camp McDowell, Ariz	Boxes marked C, E, F, K, L, N, P	Pouch E	20 months.
C. C. C. Carr	do	I	do	Camp Verde, Ariz	Boxes marked C, I, L, I, K, N, P	Old regulation pattern	8 months.
Randolph Norwood	First lieutenant	B	Second Cavalry	Camp Stambaugh, Wyo	Old regulation pattern and belt	Scouting-belt	1 month.
James N. Wheelan	do	B	do	Fort Bridger, Wyo	Old regulation pattern	do	3 months.
Frank U. Robinson	Second lieutenant	B	do	Camp Stambaugh, Wyo	do	do	1 month.
E. J. Spaulding	Captain		do	Camp Cameron, Nebr	do		17 months.
Alex. Sutorius	do		Third Cavalry	Fort Sanders, Wyo	do	Pouch E	1 month.
Alex. Moore	do		do	Fort McPherson, Nebr	do	Scouting-belt	4 months.
A. D. B. Smead	First lieutenant	"	do	do	do	do	Do.
Thomas L. Brent	Captain		do	Fort D. A. Russell, Wyo	do	do	2 months.
Anson Mills	do	F	do	North Platte, Nebr	do	do	1 month.
Wirt Davis	do		Fourth Cavalry	Fort Griffin, Tex	Old regulation pattern and pouches	Pouch E	3 months.
Edw. M. Heyl	do	K	do	Fort Richardson, Tex	Old regulation pattern	do	11 months.
A. E. Woodson	First lieutenant	A	Fifth Cavalry	Camp Verde, Ariz	do	Old regulation pattern	5 months.
S. S. Sumner	Captain	D	do	Camp Bowie, Ariz	Old regulation pattern and pouches	do	4 months.
John A. Irwin	do	D	Sixth Cavalry	Fort Wallace, Kans	do	Pouch E	1 month.
C. B. McLellan	do	L	do	Fort Dodge, Kans	Old regulation pattern	do	2 months.
Sheldon Sturgeon	do	H	do	Fort Hays, Kans	Old regulation pa'tern and pouches.	Field—Pouch E Garrison—Old regulat'n pat'n.	1 month.
Michael Cooney	do	A	Ninth Cavalry	Fort Concho, Tex	do	Scouting-belt	3 months.
F. S. Dodge	do	D	do	Fort Stockton, Tex	Old regulation pattern	Pouch E	Do.
Ed. S. Meyer	do	L	do	Fort Duncan, Tex	Boxes marked C, E, L, M, Vests H.	do	6 months.
E. D. Dimmick	First lieutenant	L	do	Fort McIntosh, Tex	do	do	3 months.
Francis Moore	Captain	L	do	do	do	Old regulation pattern	2 months.

Number of officers in favor of pouch E..... 10
Number of officers in favor of scouting-belt..... 8
Number of officers in favor of old regulation pattern..... 5

The above abstract is compiled from reports made to the Ordnance Department, and referred to the board on cavalry equipments.

L. H. CARPENTER,
Captain Tenth Cavalry, Brevet Colonel, Recorder of Board on Cavalry-Equipments.

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ABSTRACT E.—*Abstract of opinions of officers upon nickel-plated bits and felt saddle-cloths, contained in reports referred by the Ordnance Department to the Board on Cavalry-Equipments.*

Names of officers.	Rank.	Company.	Regiment.	Station.	Nickle-plated bits.		Felt saddle-cloth.		Time the articles were in actual service.
					In favor of.	Against.	In favor of.	Against.	
James Eagan	Captain	K	Second Cavalry	North Platte, Nebr	1				9 months.
H. E. Davis	Brigadier-general		Volunteers	In field during the war				1	
H. S. Stull	Captain and ordnance officer		Third Cavalry Division, volunteers				1		16 months.
D. R. Clendenin	Lieutenant-colonel		Eighth Illinois Cavalry, volunteers				1		3 months.
Sebree Smith	First lieutenant	L	Sixth Cavalry	Fort Riley, Kans	1				9 months.
W. A. Corrie	Lieutenant-colonel		Eighth Pennsylvania Cavalry	In field during the war			1		
A. Wilson	Lieutenant	K	Twenty-fifth New York Cavalry, volunteers.				1		5 months.
Henry G. Wood	First lieutenant	G	do				1		Do.
W. P. Robeson	Brevet colonel		Third New Jersey Cavalry, volunteers.				1		m nths.
S. E. Chamberlin	Captain	K	Twenty-fifth New York Cavalry, volunteers.				1		5 months.
S. N. McPherson	Major		do				1		4 months.
A. M. Randol	Colonel		Second New York Cavalry, volunteers.				1		7 months.
J. Hall	do		First Vermont Cavalry, volunteers				1		4 months.
M. H. Blynn	Major		Tenth New York Cavalry, volunteers.					1	
S. B. M. Young	Colonel		Fourth Pennsylvania Cavalry, volunteers.				1		
Robert Bell	Major		Twenty-first Pennsylvania Cavalry volunteers.					1	
I. A. Tompkins	General of		Artillery volunteers				1		36 months.
E. W. Merchand	First lieutenant		Twenty-fifth New York Cavalry, volunteers.				1		5 months.
Summary					2		13	3	

L. H. CARPENTER,
Captain Tenth Cavalry, Brevet Colonel,
Recorder of Board on Cavalry-Equipments.

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ABSTRACT F.—*Abstract of recommendations of cavalry officers in relation to the saddlers' and blacksmiths' tools and supply-table of materials, as compared with the quantity issued under General Orders No. 60, War Department, series 1872. Compiled from communications made to the Board on Cavalry-Equipments, and appended to its proceedings.*

Number appended to abstract and marked.	Names of officers	Rank.	Regiment.	Company.	Station.	SADDLERS' TOOLS. Awls, assorted, with three handles.	Scratch-awls.	Collar-palm.	Knives, shoe.	Needles, papers of	Needles for patent thread.	Punches, spring.	Punches, hand.	Sandstone.	Slicker, glass.	Screw-driver.	Files, three-cornered.	Sailmakers' needles, papers of.
1	Gerald Russell	Captain	Third Cavalry	K	Fort McPherson, Nebr	.....	...	...	...	.....	.....	.....	.....	...	...	.....	...	....
2	Henry E. Noyes	....do	Second Cavalry	I	Fort Sanders, Wyo	15	1	1	2	1 of 2 and 3; 4 of 4, 5, and 6.	1 of No. 3	1 of 4 and 7.	4 of 8	1	1	1 of 6-inch.	2	....
	S. M. Whitside	... do	Sixth Cavalry	B	Fort Hays, Kans	.....	...	...	...	.....	.....	.....	.....	...	...	.....	...	....
3	D. S. Gordon	....do	Second Cavalry	D	Camp Douglas, Utah	.....	...	...	...	.....	.....	.....	.....	...	...	.....	...	....
4	Elijah R. Wells	....do	....do	E	Fort Laramie, Wyo	.....	...	...	..	4 of 3, 4, 5, and 6.	.....	.....	.....	...	...	.....	..	1
5	James N. Wheelan	First Lieut	.. do	B	Camp Brown, Wyo	12	...	...	...	3 of 2	.....	.....	.....	...	...	.....	..	....
6	Edw. J. Spaulding	Captain	....do	C	Omaha Barracks, Nebr	.....	...	...	...	.....	.....	.....	.....	...	...	.....	..	....
	George L. Tyler	....do	....do	F	Fort Ellis, Mont	.....	...	...	...	3 of 3, 4, and 5	.....	.....	.....	...	...	.....	..	....
	C. C. C. Carr	....do	First Cavalry	I	Benicia Barracks, Cal	.....	...	1	1	.....	.....	.....	.....	...	...	.....	..	....
	Thomas McGregor	....do	....do	A	.....do	.....	...	1	2	.....	.....	.....	.....	...	...	.....	..	....
	Henry Wagner	....do	....do	C	Camp McDermit, Nev	.....	...	...	*2	.....	.....	.....	.....	...	...	.....	..	....
	R. F. Bernard	....do	....do	G	Camp Bidwell, Cal	.....	...	...	...	.....	.....	.....	.....	...	...	.....	..	....
	H. E. Tutherly	Second Lieut	....do	D	Benicia Barracks, Cal	.....	...	...	...	.....	.....	.....	.....	...	...	.....	..	....
	Moses Harris	Captain	....do	M	Fort Walla-Walla, Wash	.....	...	...	...	.....	.....	.....	.....	...	...	.....	..	....
	J. G. Trimble	....do	....do	....	Camp Harney, Oreg	.....	...	...	...	.....	.....	.....	.....	...	...	.....	..	....
	John Q. Adams	First Lieut	....do	B	Fort Klamath, Oreg	.....	...	...	...	.....	.....	.....	.....	...	...	.....	..	....
	F. K. Upham	....do	....do	L	Fort Walla-Walla, Wash	.....	...	...	...	.....	.....	.....	.....	...	...	.....	..	....
	John Mix	Captain	Second Cavalry	M	Omaha Barracks, Nebr	.....	...	...	...	.....	.....	.....	.....	...	...	.....	..	....
	Jno. P. Hatch	Lieut. Colonel	Fourth Cavalry	....	Fort Clark, Tex	.....	...	...	...	.....	.....	.....	.....	...	...	.....	..	....

* Additional—Two half-round knives, two bead-knives, two splitting-knives. Wishes increase of patent linen and shoe thread, leather, and copper rivets and burrs.
† Additional—One rounding-iron and one splitting-machine.

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ABSTRACT F.—*Abstract of recommendations of cavalry officers in relation to the saddlers and blacksmiths' tools, &c.*—Continued.

Number appended to abstract and marked.	Names of officers.	SADDLERS' MATERIALS															SMITHS' TOOLS.								SMITHS' MATERIALS.				Remarks.
		Shoe-thread, pounds of.	Linen thread, pounds of.	Iron tacks, 6 and 12 M of.	Beeswax, pounds of.	Black wax, pounds of.	Bridle-leather, pounds of.	Harness-leather, pounds of.	Collar-leather, pounds of.	Copper rivets and burrs, pounds of.	Iron bar-buckles, ¾-inch and 1¼-inch.	Roller-buckles, 1¼-inch.	Half-round buckles, 5-inch.	Halter-rings.	Girth-webbing, 12 yards, bolts of.	Neat's-foot oil, gallons of.	Halter-squares.	Collins' harness-oil, lbs. of.	Shoeing-rasps.	Rat-tail files.	Flat-files.	Half-round files.	Saw-mill files.	Three-cornered files.	Paring-knife.	Horseshoe-nails, pounds of.	Cast-steel, pounds of.	Iron, assorted.	Horseshoes.	
1	Gerald Russell	6	2	4	2	3	20	50	....	6	50	50	75	50	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
2	Henry E. Noyes	3	....	3 of 6, 12; 1 of 18.		3	5	20	30	15	5	.....	.....	.....	.....	.....	.....	.....	12	.....	.....	.....	.....	.....	.....	120	.....	.....	.....	
	S. M. Whiteside*	....	....	.....	....	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Attached to proceedings of board, and marked Appendix No. 20.
3	D. S. Gordon	4	2	3	1	3	100	250	....	2	1 grs. 1¼ in.	.....	¼ grs.	.....	.....	.....	1 grs.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
4	Elijah R. Wells	....	....	6	1	..	50	100	....	3	.....	.....	.....	.....	.....	.....	.....	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
5	James N. Wheelan	....	13	.....	....	3	16	500	....	5	¼ grs.	.....	3 doz	¼ grs.	.....	.....	.....	.....	3	2	2	2	.....	4	.....	.....	.....	.....	.....	
6	Edw. J. Spaulding	....	....	.....	....	....	....	200	50	2	.....	.....	.....	.....	.....	.....	.....	.....	6	2	1	1	1	1	1	75	10	75	1,200	
	George L. Tyler	....	....	.....	....	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
	C. C. C. Carr	5	....	.....	....	3	35	50	....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Referred by Chief of Ordnance Feb. 6, 1874, and returned to that office.
	Thomas McGregor	5	....	.....	....	3	35	50	....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
	Henry Wagner	....	....	.....	....	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
	R. F. Bernard†	....	....	.....	....	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
	H. E. Tutherly	....	....	.....	....	..	30	30	15	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
	Moses Harris§	....	....	.....	....	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
	J. G. Trimble§	....	....	.....	....	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
	John Q. Adams§	....	....	.....	....	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
	F. K. Upham	....	....	.....	....	....	25	50	20	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
	John Mix	‖1	....	4 of 10 and 12	6	1	11	45	....	1	½ grs.	24½ in., 18 1½-in.	.....	1 doz. 1¼-in.	1	....	1 doz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Attached to proceedings of Board, and marked Appendix No. 7.
	Jno. P. Hatch	....	....	.....	....	....	60	120	....	6	.....	.....	.....	.....	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Attached to proceedings of board, and marked Appendix No. 70.

L. H. CARPENTER, *Captain Tenth Cavalry, Brevet Colonel, Recorder of the Board on Cavalry Equipments, &c.*

*Recommends that neat's-foot oil, emery and emery cloth, and an additional supply of leather be furnished. †Sides. ‡Wishes amount of leather doubled. §No suggestions. ‖No. 12.

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ABSTRACT G.—*Abstract of the opinions of officers, as set forth in their answers to the questions propounded by the Board on Cavalry Equipments, the original papers being appended to this abstract.*

Number of the original paper hereto appended.	Names of officers.	Rank.	Regiment.	Company.	Station.	What increase of width in saddles is recommended at pommel-arc, and what percentage of increased size.	Sweat-leathers and saddle-skirts.		Girth.	
							In favor of.	Against.	Hair girth, in favor of.	Present girth, in favor of.
1	William B. Royall	Major	Fifth Cavalry	....	San Francisco, Cal	.....	1	....	1	.....
2	Henry Wagner	Captain	First Cavalry	C	Camp McDermit, Nev	Increase, 4 per ct., ½ inch; 3 per cent., ½ inch.	....	1	1	.....
3	Joseph Kerin	....do	Sixth Cavalry	F	Fort Hays, Kans	.....	....	....	.....	.....
4	A. P. Caraher	....do	Eighth Cavalry	F	Fort Garland, Colo	Increase, 6 per ct., ¼ inch	1	....	1	.....
5	L. H. Orleman	Second lieutenant	Tenth Cavalry	....	Fort Sill, Ind. T	Increase of largest size, 1½ inch; second size, 1 inch.	1	....	1	.....
6	R. H. Pratt	First lieutenant	....do	D	....do	Increase, 5 per ct., 1 inch; 10 per cent., ½ inch.	....	1	1	.....
7	Abraham K. Arnold	Major	Sixth Cavalry	....	.....	.....	....	1	1	.....
8	Robert G. Smither	First lieutenant	Tenth Cavalry	....	Fort Sill, Ind. T	Increase of 75 per ct., 1 inch	....	1	1	.....
9	Theo. A. Baldwin	Captain	....do	I	....do	Increase of 6 per cent	....	1	.....	1
10	S. T. Norvell	....do	....do	....	....do	Increase of 12 per ct., ¾ inch	....	1	.....	1
11	J. W. Davidson	Lieutenant-colonel	....do	....	....do	Increase of 25 per ct., 1 inch	....	1	1	.....
12	John B. Vande Wiele	Captain	....do	B	....do	Increase of 10 per ct., ½ inch	....	1	1	.....
13	E. J. Spaulding	....do	Second Cavalry	C	.....	.....	1	....	1	.....
14	D. Madden	....do	Sixth Cavalry	C	Fort Hays, Kans	.....	....	1	1	.....
15	Lewis Merrill	Major	Seventh Cavalry	....	Germantown, Pa	.....	1	....	.....	1
16	A. G. Brackett	Lieutenant-colonel	Second Cavalry	....	.....	.....	....	1	.....	1
17	H. W. Wessels, jr	Captain	Third Cavalry	H	Fort D. A. Russell, Wyo	.....	....	1	1	.....
18	James Oakes	Colonel	Sixth Cavalry	....	Fort Hays, Kans	.....	1	....	.....	.....
19	James Biddle	Major	....do	....	Fort Lyon, Colo	Increase, 20 per ct., 1 inch; 10 per cent., 2 inches.	1	....	1	.....
20	A. D. King	First lieutenant	Third Cavalry	I	Fort McPherson, Nebr	.....	....	1	1	.....
21	Thomas H. Neill	Lieutenant-colonel	Sixth Cavalry	....	Fort Gibson, Ind. T	.....	....	1	.....	1
22	C. E. Compton	Major	....do	....	Fort Dodge, Kans	Increase, 5 per ct., 1 inch	1	....	.....	1
23	William Harper, jr	First lieutenant	....do	K	Camp Supply, Ind T	.....	....	1	.....	1
24	John Mix	Captain	Second Cavalry	M	Omaha Barracks, Nebr	.....	1	....	1	.....
25	William H. Andrews	First lieutenant	Third Cavalry	L	Fort D. A. Russell, Wyo	.....	1	....	1	.....
26	Thomas B. Dewees	Captain	Second Cavalry	A	Medicine Bow, Wyo	.....	....	1	1	.....

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Rank.	Regiment.	Company.	Station.	What increase of width in saddles is recommended at pommel-arc, and what percentage of increased size.	Sweat-leathers and saddle-skirts.		Girth.	
							In favor of.	Against.	Hair girth, in favor of.	Present girth, in favor of.
27	G. Russell	Captain	Third Cavalry	K	Fort McPherson, Nebr			1	1	
28	H. H. Crews	First lieutenant	Fourth Cavalry	K	Fort Clark, Tex	Increase, 10 per ct., $\frac{3}{8}$ inch		1	1	
29	William B. Kennedy	Captain	Tenth Cavalry	F	Fort Sill, Ind. T			1	1	
30	John Lee	do	Fourth Cavalry	D	Fort Clark, Tex			1		
31	John P. Hatch	Lieutenant-colonel	do		do			1	1	
32	B. H. Grierson	Colonel	Tenth Cavalry		Fort Sill, Ind. T		1			1
33	Thomas McGregor	Captain	First Cavalry	A	Benicia Barracks, Cal	Increase, 1 inch higher at pommel.	1		1	
34	C. B. McLellan	do	Sixth Cavalry	L	Fort Riley, Kans			1	1	
35	A. D. B. Smead	First lieutenant	Third Cavalry	F	Fort McPherson, Nebr			1	1	
36	D. S. Gordon	Captain	Second Cavalry	D	Camp Douglas, Utah			1	1	
37	Joseph Lawson	First lieutenant	Third Cavalry	A	Sidney Barracks, Nebr	Increase, 12 per ct., $\frac{1}{2}$ inch	1		1	
38	J. I. Gregg	Colonel	Eighth Cavalry		Sante Fé, N. Mex			1	1	
39	Emmet Crawford	First lieutenant	Third Cavalry		Fort D. A. Russell, Wyo	Increase in issue of Nos. 11, 11½, and 12.	1		1	
40	T. C. Tupper	Captain	Sixth Cavalry	G	Fort Dodge, Kans	Increase, 5 per ct., $\frac{3}{4}$ inch	1			
41	Washington L. Elliott	Lieutenant-colonel	First Cavalry		Benicia Barracks, Cal			1	1	
42	J. Scott Payne	Second lieutenant	Sixth Cavalry		Fort Lyon, Colo	Increase, 20 per ct., 1½ inches	1		1	
43	S. M. Whitside	Captain	Sixth Cavalry	B	Fort Hays, Kans		1			1
44	C. G. Gordon	First lieutenant	do	E	Fort Gibson, Indian Ter	Size, 13		1		1
45	Alvan C. Gillem	Colonel	First Cavalry		Benicia Barracks, Cal		1		1	
46	J. McAllister	Major	Ordnance Dep't		Benicia Arsenal, Cal		1		1	
47	John V. Du Bois	do	Third Cavalry		Fort McPherson, Nebr	Increased number of sizes		1	1	
	William R. Harmon	Second lieutenant	Tenth Cavalry		Fort Sill, Indian Ter	Increase, 50 per ct., 1 inch; 50 per cent., ½ inch.		1	1	
49	H. E. Tutherly	do	First Cavalry	D	Benicia Barracks, Cal		1		1	
50	Frank U. Robinson	do	Second Cavalry	B	Camp Douglas, Utah			1	1	
51	Charles D. Viele	Captain	Tenth Cavalry	C	Fort Sill, Indian Ter		1		1	
52	William McCleave	do	Eighth Cavalry	B	Fort Union, N. Mex			1	1	
53	R. F. Bernard	do	First Cavalry	G	Camp Bidwell, Cal			1	1	
54	Louis T. Morris	do	Eighth Cavalry	L	Fort Union, N. Mex			1		

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55	E. R. Wells	do	Second Cavalry	E	Fort Laramie, Wyo			1	1	
56	C. H. Carlton	do	Tenth Cavalry		Fort Sill, Indian Ter			1	1	
57	O. W. Budd	Second lieutenant	Fourth Cavalry	M	Fort Duncan, Tex	Increase, 1 inch	1			1
58	A. E. Wood	do	do	L	Fort Clark, Tex		1			1
59	A. P. Morrow	Major	Ninth Cavalry		San Antonio, Tex			1	1	
60	C. Mauck	Captain	Fourth Cavalry	B	Fort Clark, Tex	Increase, 10 per ct., ⅝ inch; 10 per cent., ¾ inch.		1	1	
61	Wesley Merritt	Lieutenant-colonel	Ninth Cavalry		Fort Concho, Tex			1		1
62	Henry E. Noyes	Captain	Second Cavalry	I	Fort Sanders, Wyo	Increase, 3 per ct., 1 inch; 2 per cent., 1½ inch.	1		1	
63	Alexander Sutorius	do	Third Cavalry	E				1	1	
64	S. B. M. Young	do	Eighth Cavalry	M	Fort Union, N. Mex			1	1	
65	Thomas C. Devin	Lieutenant-colonel	do		Santa Fé, N. Mex		1		1	
66	G. W. Schofield	Major	Tenth Cavalry		Springfield, Mass			1		1
67	Byron Dawson	First lieutenant	Ninth Cavalry	M	Fort Stockton, Tex			1	1	
68	Charles Meinhold	Captain	Third Cavalry	B	Fort McPherson, Nebr				1	
69	F. S. Dodge	do	Ninth Cavalry	D	Fort McKavett, Tex			1		1
70	Michael Cooney	do	do	A	Fort Concho, Tex			1		1
71	Nicholas Nolan	do	Tenth Cavalry	A	Fort Sill, Indian Ter					1
72	Anson Mills	do	Third Cavalry	M	North Platte, Nebr			1	1	
73	Andrew J. Alexander	Major	Eighth Cavalry		Fort Union, N. Mex			1	1	
74	A. B. Kauffman	Captain	do	E	Fort Wingate, N. Mex	Issue, 20 per ct., 10¾ inches; 50 per ct., 11 inches; 30 per cent., 11½ inches.		1	1	
75	William W. Tyler	First lieutenant	Ninth Cavalry	I	Fort Davis, Tex			1	1	
76	John Q. Adams	do	First Cavalry	B	Fort Klamath, Oreg			1	1	
77	Peter M. Boehm	Captain	Fourth Cavalry	E	Fort Duncan, Tex	All one size larger		1		1
78	Samuel S. Sumner	do	Fifth Cavalry	D	Camp Bowie, Ariz			1	1	
79	George A. Custer	Lieutenant-colonel	Seventh Cavalry		Fort Abraham Lincoln, Dak			1	1	
80	Myles Moylan	Captain	do	A	do			1	1	
81	George W. Yates	do	do	F	do			1	1	
82	William Thompson	do	do	B	do			1	1	
83	Donald McIntosh	First lieutenant	do	G	do			1	1	
84	Thomas W. Custer	do	do		do			1	1	
85	John F. Weston	do	do	L	do			1	1	
86	Thomas M. McDougall	do	do	E	do			1	1	
87	Benjamin H. Hodgson	Second lieutenant	do		do			1	1	
88	Charles A. Varnum	do	do		do			1	1	
89	George D. Wallace	do	do		do			1	1	
90	William T. Craycroft	do	do		do			1	1	
91	G. C. Doane	First lieutenant	Second Cavalry	G	Fort Ellis, Mont			1	1	
92	E. G. Mathey	do	Seventh Cavalry	M	Fort Rice, Dak	Increase, 1 inch higher	1			1
93	William H. Brown	Captain	Fifth Cavalry	F	Camp Grant, Ariz		1		1	
94	Robert P. Wilson	do	do	A	Camp Verde, Ariz	Increase, 25 per ct. 1 inch larger than 12-inch size.	1		1	
95	Edmund Luff	First lieutenant	Eighth Cavalry	I	Fort Bayard, N. Mex			1	1	
96	James G. MacAdams	do	Second Cavalry	H	Fort Ellis, Mont		1		1	
97	N. B. Sweitzer	Major	do		do			1	1	
98	Lewis Thompson	Captain	do	L	do				1	
99	G. L. Tyler	do	do	F	do				1	
100	A. B. Wells	do	Eighth Cavalry	A	Fort Bayard, N. Mex			1	1	
101	James Egan	do	Second Cavalry	K	Fort Laramie, Wyo			1		1

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Rank.	Regiment.	Company.	Station.	What increase of width in saddles is recommended at pommel-arc, and what percentage of increased size.	Sweat-leathers and saddle-skirts.		Girth.	
							In favor of.	Against.	Hair girth, in favor of.	Present girth, in favor of.
102	James F. Wade	Major	Ninth Cavalry	....	Ringgold Barracks, Tex		....	1	1	.....
103	William Gerhard	First lieutenant	....do	G	....do		....	1	1	.....
104	Francis Moore	Captain	....do	L	....do		....	1	1	.....
105	John T. Morrison	First lieutenant	Tenth Cavalry	E	Fort Sill, Indian Ter	Increase of 6 per ct. Made wider.	....	1	.....	1
106	Thomas Little	Captain	....do	....	....do	....do	....	1	.....	1
107	Thomas J. Spencer	First lieutenant	....do	....	....do	....do	....	1	.....	1
108	Thomas C. Lebo	....do	....do	....	....do	....do	....	1	.....	1
109	George H. Evans	Second lieutenant	....do	....	....do	....do	....	1	.....	1
110	Frank P. Reap	....do	....do	....	....do	....do	....	1	.....	1
111	James F. Randlett	Captain	Eighth Cavalry	D	Fort Stanton, N. Mex		1	....	1	.....
112	Elmer Otis	Major	First Cavalry	....		Increase, 10 per ct. 1 inch larger.	....	1	1	.....
113	J. G. Trimble	Captain	....do	H		....do	....	1	1	.....
114	Edw. S. Godfrey	First lieutenant	Seventh Cavalry	K	Fort Rice, Dak	Increase, ½ inch	1	....	1	.....
115	Sebastian Gunther	Captain	Fourth Cavalry	H	Fort Clark, Tex		1	....	1	.....
116	Eug. A. Carr	Lieutenant-colonel	Fifth Cavalry	....	Camp Lowell		1	....	1	.....
117	Charles C. Cresson	First lieutenant	First Cavalry	K		Increase of 10 per cent. 1 inch wider.	....	1	1	.....
118	C. C. C. Carr	Captain	....do	F			....	....	1	.....
119	Oscar Hagen	....do	Ninth Cavalry	B	Camp near King's Ranch, Tex		....	1	1	.....
120	S. D. Sturgis	Colonel	Seventh Cavalry	....	Saint Paul, Minn		....	1	1	.....
121	F. K. Upham	First lieutenant	First Cavalry	L			1	....	1	.....
122	Moses Harris	Captain	....do	M			1	....	1	.....
123	Charles D. Parkhurst	Second lieutenant	Fifth Cavalry	E	Camp McDowell, Ariz		....	1	1	.....
124	A. E. Latimer	Major	Fourth Cavalry	....	Fort Duncan, Tex		....	1	.....	1
125	R. H. Montgomery	Captain	Fifth Cavalry	B	Camp Apache, Ariz		....	1	.....	1
126	George A. Drew	First lieutenant	Third Cavalry	C			....	1	1	.....
127	N. A. M. Dudley	Major	....do	....		10 per cent., ½ inch	1	....	1	.....

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Fastening for girth.		Saddle-bag.		Recommendations on the curb-bit.	Light halter-chain in addition to leather halter-strap.		Recommendations on the curry-comb.	Recommendations on the horse-brush.
		Cincha-strap fastening—In favor of.	Buckle fastening—In favor of.	Leather saddle-bag—In favor of.	Canvas saddle-bag—In favor of.		In favor of.	Against.		
1	William B. Royall	1	.....	1	.....	Lighter bit	.....	1	.....	Leather back; better material.
2	Henry Wagner	1	.....	.....	1	....do	1	.....	.....	Leather back.
3	Joseph Kerin	.....	.....	1	.....	Old dragoon bit	.....	1	.....	Better quality of hair.
4	A. P. Caraher	1	.....	1	.....	.....	.....	.....	.....	Hair ½ inch longer.
5	L. H. Orleman	1	.....	1	.....	Straight steel branches	1	.....	Strap	Leather back.
6	R. H. Pratt	1	.....	.....	.....	Milder bit	1	.....	Better quality	Do.
7	Abraham K. Arnold	1	.....	1	.....	Jenifer bit	.....	1	.....	
8	Robert G. Smither	.....	1	1	.....	Old dragoon bit	.....	1	Better material	
9	Theo. A. Baldwin	1	.....	.....	.....	.....	1	.....	Bettter quality	Better quality.
10	S. T. Norvell	1	.....	1	.....	Old dragoon bit	1	.....	.....	
11	J. W. Davidson	1	.....	1	.....	....do	1	.....	.....	
12	John B. Vande Wiele	.....	1	1	.....	.....	1	.....	.....	Bristles 1 inch long.
13	E. J. Spaulding	1	.....	1	.....	Lighter bit	1	.....	.....	Leather back.
14	D. Madden	1	.....	1	.....	Old dragoon bit	.....	1	.....	Better quality of hair.
15	Lewis Merrill	1	.....	.....	1	Lighter bit	.....	1	.....	Leather back.
16	A. G. Brackett	.....	1	1	.....	.....	.....	.....	.....	
17	H. W. Wessels, jr	1	.....	.....	1	.....	1	.....	.....	
18	James Oakes	.....	1	1	.....	Lighter bit	.....	1	Rubber brush-comb	Better quality.
19	James Biddle	1	.....	1	.....	....do	.....	1	.....	Leather back.
20	A. D. King	1	.....	1	.....	Old dragoon bit	1	.....	.....	Do.
21	Thomas H. Neill	.....	1	.....	1	....do	.....	1	.....	Do.
22	C. E. Compton	1	.....	1	.....	Lighter bit	1	.....	Rubber comb, with metal points.	Better quality.
23	William Harper, jr	.....	1	1	.....	.....	1	.....	.....	
24	John Mix	.....	1	.....	1	.....	.....	1	Strap	
25	William H. Andrews	1	.....	.....	1	Burdoon bit, in use in the English cavalry.	1	.....	.....	Leather back.
26	Thomas B. Dewees	.....	1	1	.....	Smaller bit	.....	1	.....	Gutta-percha, with whalebone bristles.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Fastening for girth.		Saddle-bag.		Recommendations on the curb-bit.	Light halter-chain in addition to leather halter-strap.		Recommendations on the curry-comb.	Recommendations on the horse-brush.
		Cincha-strap fastening—in favor of.	Buckle fastening—in favor of.	Leather saddle-bag—in favor of.	Canvas saddle-bag—in favor of.		In favor of.	Against.		
27	G. Russell	.....	1	1	.....	.....	1	.....	.....	
28	H. H. Crews	.....	1	.....	1	.....	1	.....	.....	Leather back.
29	William B. Kennedy	1	.....	1	.....	Lighter bit	1	.....	Open back	Do.
30	John Lee	.....	1	1	.....	....do	1	.....	.....	
31	John P. Hatch	.....	1	1	.....	.....	1	.....	.....	Bristles instead of whalebone.
32	B. H. Grierson	.....	1	1	.....	Milder bit	1	.....	Better material	
33	Thomas McGregor	1	.....	1	.....	Mild bit, No. 4	1	.....	.....	Leather back.
34	C. B. McLellan	1	.....	1	.....	Grimsley bit	1	.....	.....	
35	A. D. B. Smead	1	.....	1	.....	Shoemaker bit	1	.....	.....	
36	D. S. Gordon	.....	1	1	.....	.....	1	.....	.....	
37	Joseph Lawson	.....	1	1	.....	Shoemaker bit	.....	1	.....	
38	J. I. Gregg	1	.....	1	.....	Roberts bit	1	.....	.....	
39	Emmet Crawford	1	.....	1	.....	.....	1	.....	.....	
40	T. C. Tupper	.....	1	1	.....	Old dragoon bit	1	.....	.....	Leather back.
41	Washington L. Elliott	.....	1	1	.....	Shoemaker bit	1	.....	Strap	Flexible back.
42	J. Scott Payne	1	.....	1	.....	....do	1	.....	Better material	Better material.
43	S. M. Whitside	.....	1	1	.....	Daniels bit	.....	1	.....	
44	C. G. Gordon	.....	1	.....	1	Baldwin bit	.....	1	.....	Leather back.
45	Alvan C. Gillem	1	.....	.....	1	Grimsley bit	.....	.....	.....	Do.
46	J. McAllister	1	.....	1	.....	Bit No. 2, with shorter cheek-pieces.	1	.....	.....	
47	John V. Du Bois	1	.....	1	.....	Chiffany bit	1	.....	.....	Better quality.
48	William R. Harmon	1	.....	1	.....	Milder bit	1	.....	Strap	Leather back.
49	H. E. Tutherly	1	.....	1	.....	.....	1	.....	.....	
50	Frank U. Robinson	1	.....	1	.....	Old dragoon bit	.....	1	.....	
51	Charles D. Viele	1	.....	.....	.....	.....	1	.....	.....	
52	William McCleave	1	.....	1	.....	Shoemaker bit	.....	1	.....	
53	R. F. Bernard	1	.....	.....	1	Lighter bit	1	.....	.....	Do.
54	Louis T. Morris	.....	.....	.....	1	.....	.....	1	Strap	Do.

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55	E. R. Wells		1	1		Lighter bit		1			
56	C. H. Carlton	1		1			1				
57	O. W. Budd		1	1		Old dragoon bit	1				Hair bristles.
58	A. E. Wood		1	1				1			Longer bristles.
59	A. P. Morrow		1	1		Lighter bit	1				Bristles.
60	C. Mauck		1		1		1		Better quality		Leather back.
61	Wesley Merritt		1	1		Old dragoon bit	1		Strap		Flexible back.
62	Henry E. Noyes		1	1		do	1		Open back		Leather back.
63	Alexander Sutorius		1	1		do	1		do		Do.
64	S. B. M. Young	1			1			1	Strap		Do.
65	Thomas C. Devin	1			1	Shoemaker bit	1				
66	G. W. Schofield	1			1	Lighter bit					
67	Byron Dawson	1		1		do	1				
68	Charles Meinhold	1		1		do		1			Better materials.
69	F. S. Dodge		1	1		Old dragoon bit	1		Strap		Leather back.
70	Michael Cooney		1	1		do			do		Do.
71	Nicholas Nolan		1	1		do	1		do		Do.
72	Anson Mills	1		1		Lighter bit		1			
73	Andrew J. Alexander	1			1			1	Strap		Flexible back.
74	A. B. Kauffman	1			1	Lighter bit		1	do		Leather back.
75	William W. Tyler		1	1			1				
76	John Q. Adams	1		1				1	Open back		Do.
77	Peter M. Boehm		1	1		Brass bit		1			Do.
78	Samuel S. Sumner	1		1		Brass bit, Grimsley patent	1				Do.
79	George A. Custer		1	1		Present bit, steel	1		Better quality		Leather back and hair.
80	Myles Moylan		1	1		do	1		do		Do.
81	George W. Yates		1	1		do	1		do		Do.
82	William Thompson		1	1		do	1		do		Do.
83	Donald McIntosh		1	1		do	1		do		Do.
84	Thomas W. Custer		1	1		do	1		do		Do.
85	John F. Weston		1	1		do	1		do		Do.
86	Thomas M. McDougall		1	1		do	1		do		Do.
87	Benjamin H. Hodgson		1	1		do	1		do		Do.
88	Charles A. Varnum		1	1		do	1		do		Do.
89	George D. Wallace		1	1		do	1		do		Do.
90	William T. Craycroft		1	1		do	1		do		Do.
91	G. C. Doane	1		1		Lighter bit	1				Leather back.
92	E. G. Mathey		1	1			1				Do.
93	William H. Brown	1		1			1				Do.
94	Robert P. Wilson	1		1		Lighter bit	1		Better quality		Do.
95	Edmund Luff	1			1	do	1		do		
96	James G. MacAdams		1	1			1				Do.
97	N. B. Sweitzer		1	1			1				
98	Lewis Thompson		1	1		Stronger curb-hook	1		Hutchings & Sons, Connecticut.		
99	G. L. Tyler	1		1		Lighter bit	1				
100	A. B. Wells	1			1	No. 2 cavalry bit		1			
101	James Egan		1	1			1				
102	James F. Wade	1		1		Milder bit		1			Do.
103	William Gerhard		1	1		do	1				Better quality of hair.
104	Francis Moore		1			do	1				Better quality.
105	John T. Morrison	1		1		Size Nos. 1 and 2	1		Better quality		Do.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Fastening for girth.		Saddle-bag.		Recommendations on the curb-bit.	Light halter-chain in addition to leather halter-straps.		Recommendations on the curry-comb.	Recommendations on the horse-brush.
		Cinchs-strap fastening—in favor of.	Buckle fastening—in favor of.	Leather saddle-bag—in favor of.	Canvas saddle-bag—in favor of.		In favor of.	Against.		
106	Thomas Little	1	.....	1	.....	Size Nos. 1 and 2	1	.....	Better quality	Better quality
107	Thomas J. Spencer	1	.....	1	.....	....do	1	.....	....do	Do.
108	Thomas C. Lebo	1	.....	1	.....	....do	1	.....	....do	Do.
109	George H. Evans	1	.....	1	.....	....do	1	.....	....do	Do.
110	Frank P. Reap	1	.....	1	.....	....do	1	.....	....do	Do.
111	James F. Randlett	1	.....	1	.....		1	.....		Leather back.
112	Elmer Otis	1	.....	1	.....		1	.....	Strap	Do.
113	J. G. Trimble	1	.....	1	.....	Old Kearney bit	.....	1		
114	Edw. S. Godfrey	1	.....	1	.....	Lighter bit	1	.....		Do.
115	Sebastian Gunther	.....	1	1	.....	Old dragoon bit	1	.....	Strap	Do.
116	Eug. A. Carr	1	.....	1	.....	Baucher bit	.....	1	Open back	Do.
117	Charles C. Creason	1	.....	1	.....	Old Kearney bit	.....	1	Strap	Do.
118	C. C. C. Carr	1	.....	1	.....	Lighter (brass) bit	1	.....		Do.
119	Oscar Hagen	1	.....	1	.....		1	.....		Flexible back.
120	S. D. Sturgis	.....	1	1	.....		1	.....		Leather back.
121	F. K. Upham	1	.....	1	.....	Lighter bit	.....	1		Do.
122	Moses Harris	1	.....	1	.....	....do	.....	1		Do.
123	Charles D. Parkhurst	1	.....	1	.....	....do	1	.....	Smaller curry-comb	Do.
124	A. E. Latimer	*1	1*	1	.....	....do	.....	1	Open back	Do.
125	R. H. Montgomery	.....	1	1	.....	....do	.....	1	Smaller comb	Do.
126	George A. Drew	1	.....	.....	1		1	.....		
127	N. A. M. Dudley	.....	1	1	.....	Shoemaker bit	.....	1		Martin's brush.

* Recommends both.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Recommendations on the change in the lariat.		Suggestions on change in the picket-pin.	Dark-blue felt saddle-cloth in addition to saddle-blankets.		Recommendations in regard to side-lines.	Iron pins three feet long with rings on top to fasten picket-line to the ground.	
		Horse-hair—in favor of.	Change recommended.		In favor of.	Against.		In favor of.	Against.
1	William B. Royall	1				1	Rope		
2	Henry Wagner	1			1			1	
3	Joseph Kerin		Manila rope	Col. James Oakes's picket-pin	1			1	
4	A. P. Caraher	1			1			1	
5	L. H. Orleman	1				1	Chains to lengthen and shorten		
6	R. H. Pratt	1				1			1
7	Abraham K. Arnold	1		Picket-pin invented by first sergeant of Captain McLellan's company, Sixth Cavalry.	1		Chains to be shorter	1	
8	Robert G. Smither	1					Chains shorter		1
9	Theo. A. Baldwin	1	Buffalo hair		1		do	1	
10	S. T. Norvell								
11	J. W. Davidson	1					Chains to lengthen and shorten		1
12	John B. Vande Wiele	1		15 inches long	1		2 feet 10 inches proper length	1	
13	E. J. Spaulding	1							
14	D. Madden		½-inch Manila rope	Col. James Oakes's picket-pin			Chains shorter	1	
15	Lewis Merrill			Steel		1	Rope		
16	A. G. Brackett						do		1
17	H. W. Wessels, jr	1		Lyon's patent					
18	James Oakes		Manila rope	3 inches longer with swivel	1		Chains shorter	1	
19	James Biddle	1				1			
20	A. D. King		Hempen rope, ½-inch	Lyon's patent	1		Chains shorter	1	
21	Thomas H. Neill	1		Picket-pin of first sergeant of Captain McLellan's company, Sixth Cavalry.	1			1	
22	C. E. Compton				1		25 per cent., 26 inches; 50 per cent., 30 inches; 25 per cent., 32 inches.	1	
23	William Harper, jr		Rope			1			
24	John Mix	1		Swivel at top	1		17 to 21 inches long	1	

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Recommendations on the change in the lariat.		Suggestions on change in the picket-pin.	Dark-blue felt saddle cloth in addition to saddle-blankets.		Recommendations in regard to side-lines.	Iron pins three feet long with rings on top to fasten picket-line to the ground.	
		Horse-hair—in favor of.	Change recommended.		In favor of.	Against.		In favor of.	Against.
25	William H. Andrews	1		Lyon's patent	1		2 feet long	1	
26	Thomas B. Dewees	1		12 inches long	1		Rope, 22, 24, 26 inches long		1
27	G. Russell	1		Lyon's patent	1			1	
28	H. H. Crews		Manila rope, ¾-inch		1		Double leather, 24 inches long	1	
29	William B. Kennedy			Four-sided, 15 inches long	1		Leather straps		1
30	John Lee	1			1			1	
31	John P. Hatch		Manila rope, ¾-inch	Swivel		1	Chains 24 to 22 inches long		1
32	B. H. Grierson			Steel point	1				1
33	Thomas McGregor	1		Swivel at top	1		Chains 22 to 26 inches	1	
34	C. B. McLellan					1		1	
35	A. D. B. Smead		Rope	Lyon's patent	1			1	
36	D. S. Gordon	1				1	General Palmer's patent front hopples.	1	
37	Joseph Lawson		Rope	Lyon's patent	1		20 inches proper length	1	
38	J. I. Gregg		Rawhide		1				1
39	Emmet Crawford		Rope		1			1	
40	T. C. Tupper	1			1			1	
41	Washington L. Elliott	1	Long hair	Swivel-ring	1		18 inches long, to lengthen and shorten.	1	
42	J. Scott Payne	1		Swivel at top	1		Chains shorter	1	
43	S. M. Whitside		Manila rope	Longer, and swivel	1			1	
44	C. G. Gordon			Sergeant Kirk's (Sixth Cavalry) picket-pin.	1			1	
45	Alvan C. Gillem	1		Good swivel	1			1	
46	J. McAllister					1	Chains 2 feet 2 inches; sides 3 feet.		
47	John V. Du Bois		Rope					1	

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48	William R. Harmon	1				1	Chains to lengthen and shorten	1		
49	H. E. Tutherly				1		Chains 22 to 26 inches long			
50	Frank U. Robinson	1			1			1		
51	Charles D. Viele	1				1	Chains to lengthen and shorten			1
52	William McCleave		Buckskin		1		Chains 24 to 26 inches long	1		
53	R. F. Bernard			Good steel		1		1		
54	Louis T. Morris		Buckskin	Revolving swivel	(*)			1		
55	E. R. Wells	1	With swivel			1	Chains 20 inches long			
56	C. H. Carlton					1	Chains to lengthen and shorten			1
57	O. W. Budd		Manila rope	Better material		1	Chains 2½ feet long			1
58	A. E. Wood	1			1					1
59	A. P. Morrow				1		Chains 2 feet long			1
60	C. Mauck		Manila rope			1	Chains 24 inches long	1		
61	Wesley Merritt				1		Chains to lengthen and shorten	1		
62	Henry E. Noyes	1		Picket-pin of First Sergt. A. I. House, Company I, Second Cavalry.	1		Chains 18 to 20 inches long	1		
63	Alexander Sutorius	1		Picket-pin of Blacksmith Mace, Second Cavalry.	1		Chains 20 inches long	1		
64	S. B. M. Young		Buckskin	Revolving swivel	(*)			1		
65	Thomas C. Devin	1			1					
66	G. W. Schofield					1				
67	Byron Dawson		Manila rope		1		Chains 2½ feet long	1		
68	Charles Meinhold		do	Lyon's patent	1		Chains 2 feet long	1		
69	F. S. Dodge				1		Chains to lengthen and shorten			1
70	Michael Cooney	1	Swivel		1					1
71	Nicholas Nolan	1			1					1
72	Anson Mills			Lyon's patent						
73	Andrew J. Alexander		Buckskin	Swivel	(*)			1		
74	A. B. Kauffman	1	And rope			1	Halter-shank	1		
75	William W. Tyler	1			1		Chains 2 feet 5 inches long	1		
76	John Q. Adams	1			1			1		
77	Peter M. Boehm		Manila rope	Better material	1		Chains 2½ feet long			1
78	Samuel S. Sumner	1			1		Chains 18 to 20 inches long—swivel.	1		
79	George A. Custer	1		15 inches long	1		75 per cent., 28 inches; 25 per cent., 30 inches long.			1
80	Myles Moylan	1		do	1		do			1
81	George W. Yates	1		do	1		do			1
82	William Thompson	1		do	1		do			1
83	Donald McIntosh	1		do	1		do			1
84	Thomas W. Custer	1		do	1		do			1
85	John F. Weston	1		do	1		do			1
86	Thomas M. McDougall	1		do	1		do			1
87	Benjamin H. Hodgson	1		do	1		do			1
88	Charles A. Varnum	1		do	1		do			1
89	George D. Wallace	1		do	1		do			1
90	William T. Craycroft	1		do	1		do			1
91	G. C. Doane	1			1		Chains 24 inches long	1		
92	E. G. Mathey	1			1		Hopples	1		

*In favor of gray.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Recommendations on the change in the lariat.		Suggestions on change in the picket-pin.	Dark-blue felt saddle-cloth in addition to saddle-blankets.		Recommendations in regard to side-lines.	Iron pins three feet long, with rings on top to fasten picket-line to the ground.	
		Horse-hair—in favor of.	Change recommended.		In favor of.	Against.		In favor of.	Against.
93	William H. Brown	1		Bayonet-shaped pin		1		1	
94	Robert P. Wilson	1				1		1	
95	Edmund Luff					1	Chains 20 inches long		1
96	James G. MacAdams	1				1	Chains 18 inches long	1	
97	N. B. Sweitzer	1				1	Chains 17 to 20 inches long	1	
98	Lewis Thompson					1	Chains 16 inches long		1
99	G. L. Tyler	1						1	
100	A. B. Wells	1			1				1
101	James Egan		Rope with swivel			1	35 per cent., 2 feet 5 inches; 65 per cent., 2 feet 7 inches.	1	
102	James F. Wade	1			1			1	
103	William Gerhard	1				1	Chains 22 to 24 inches long	1	
104	Francis Moore	1						1	
105	John T. Morrison	1	Buffalo hair			1	25 per cent. shorter	1	
106	Thomas Little	1	do			1	25 per cent. of chains shorter	1	
107	Thomas J. Spencer	1	do			1	do	1	
108	Thomas C. Lebo	1	do			1	do	1	
109	George H. Evans	1	do			1	do	1	
110	Frank P. Reap	1	do			1	do	1	
111	James F. Randlett	1		15 inches long	1		Chains 24 inches long	1	
112	Elmer Otis	1			1		Hopples	1	
113	J. G. Trimble			Kiernan's invention	1			1	
114	Edw. S. Godfrey		½-inch Manila rope		1				1
115	Sebastian Gunther	1		Swivel on top	1			1	
116	Eug. A. Carr		Better rope	Ring on top		1		1	
117	Charles C. Cresson	1	With swivel		1		Hopples	1	
118	C. C. C. Carr	1			1			1	
119	Oscar Hagen	1			1		Chains 2 feet long	1	

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120	S. D. Sturgis	1			1		20 to 22 inches from ring to ring		1		
121	F. K. Upham	1		Picket-pin of First Lieut. F. K. Upham.	1				1		
122	Moses Harris	1		do	1				1		
123	Charles D. Parkhurst	1		Swivel	1				1		
124	A. E. Latimer	1		Larger heads		1	Chains 22 to 26 inches long		1		
125	R. H. Montgomery	1				1			1		
126	George A. Drew	1				1			1		
127	N. A. M. Dudley		½-inch hemp rope	William Lyon's patent	1		Chains 20 inches long		1		

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Saber-slings attached to waist-belt by two straps at one point, or by attachment from two separate points.		Pistol-holster.		Recommendations in regard to the carrying of the ammunition.		Mountain-howitzer forge.		Proposed transportation of the portable forge in a two-wheeled vehicle.		What manufacture of horseshoes preferred.
				Flap.	Strap.							
		Attachment by two straps at one point, Stuart's attachment—in favor of.	Attachment from two separate points—in favor of.	In favor of.	In favor of.	For use in field.	For use in garrison.	In favor of.	Against.	In favor of.	Against.	
1	William B. Royall	.....	1	1	.....	Scouting-belt	.....	1	.....	.....	1	Goodenough.
2	Henry Wagner	.....	1	1	.....	....do	.....	1	.....	1	.....	Do.
3	Joseph Kerin	1	.....	1	.....	.....	.....	.....	1	1	.....	Rhode Island Company.
4	A. P. Caraher	1	.....	.....	1	Pouch	Box No. 1	1	.....	.....	.....	
5	L. H. Orleman	1	.....	1	.....	....do	Pouch	1	.....	1	.....	Burden.
6	R. H. Pratt	.....	.....	.....	1	Scouting-belt	Box No. 1	.....	.....	1	.....	Do.
7	Abraham K. Arnold	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	
8	Robert G. Smither	1	.....	.....	.....	Pouch	Pouch	.....	1	1	.....	
9	Theo. A. Baldwin	.....	.....	.....	.....	Scouting-belt	Box No. 1	1	.....	1	.....	
10	S. T. Norvell	1	.....	1	.....	....do	Pouch	1	.....	.....	1	
11	J. W. Davidson	1	.....	1	.....	Pouch	....do	.....	.....	1	.....	Do.
12	John B. Vande Wiele	1	.....	1	.....	....do	....do	1	.....	1	.....	
13	E. J. Spaulding	1	.....	1	.....	Scouting-belt	Scouting-belt	.....	1	1	.....	Do.
14	D. Madden	.....	1	1	.....	.....	.....	1	.....	.....	.....	Rhode Island Company.
15	Lewis Merrill	1	.....	.....	1	Pouch	Pouch	.....	.....	.....	1	Burden.
16	A. G. Brackett	1	.....	1	.....	.....	.....	.....	1	.....	1	
17	H. W. Wessels, jr	.....	1	1	.....	.....	.....	.....	.....	.....	1	Do.
18	James Oakes	1	.....	1	.....	Pouch	Pouch	1	.....	1	.....	Do.
19	James Biddle	.....	1	.....	1	....do	....do	.....	.....	1	.....	Do.
20	A. D. King	1	.....	.....	1	Scouting-belt	Box No. 1	1	.....	1	.....	
21	Thomas H. Neill	.....	1	.....	1	Pouch	Pouch	.....	1	1	.....	Do.
22	C. E. Compton	1	.....	.....	1	Scouting-belt	Scouting-belt	.....	.....	1	.....	Do.
23	William Harper, jr	1	.....	.....	.....	.....	.....	.....	.....	.....	1	
24	John Mix	1	.....	1	.....	Scouting-belt	.....	.....	1	1	.....	Do.
25	William H. Andrews	.....	.....	1	.....	....do	.....	.....	.....	1	.....	Do.
26	Thomas B. Dewees	1	.....	.....	1	.....	Pouch	.....	1	1	.....	

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27	G. Russell	1		1		Scouting-belt		1			1	Do.
28	H. H. Crews	1			1					1		
29	William B. Kennedy	1			1	Scouting-belt	Box No. 1	1			1	
30	John Lee	1		1		....do				1		
31	John P. Hatch	1									1	Griffith.
32	B. H. Grierson		1			Pouch	Pouch			1		Burden.
33	Thomas McGregor	1		1		Scouting-belt	Scouting-belt				1	Perkins.
34	C. B. McLellan		1	1		Pouch	Pouch		1	1		Burden.
35	A. D. B. Smead	1		1		Scouting-belt		1				Schönberger & Co.
36	D. S. Gordon		1		1	Pouch	Pouch	1			1	Burden.
37	Joseph Lawson	1			1	Scouting-belt	Box No. 2	1		1		Do.
38	J. I. Gregg	1									1	
39	Emmet Crawford		1			Scouting-belt	Box No. 1			1		Do.
40	T. C. Tupper	1				Pouch	Pouch				1	
41	Washington L. Elliott			1		....do	....do	1			1	
42	J. Scott Payne	1		1		....do	....do			1		Do.
43	S. M. Whitside	1		1		....do	....do	1		1		Do.
44	C. G. Gordon		1		1	....do	....do		1	1		Do.
45	Alvan C. Gillem	1		1		Scouting-belt	Scouting-belt	1			1	Do.
46	J. McAllister				1	....do					1	
47	John V. Du Bois	1			1	Scouting-belt					1	
48	William R. Harmon	1		1		....do	Scouting-belt	1			1	Burden.
49	H. E. Tutherly	1			1	....do					1	Perkins.
50	Frank U. Robinson		1	1		....do	Box No. 1		1	1		
51	Charles D. Viele	1		1		....do		1		1		Burden.
52	William McCleave		1		1	....do	Box No. 1		1		1	Do.
53	R. F. Bernard	1			1	....do		1			1	Do.
54	Louis T. Morris		1		1	Pouch	Box No. 1				1	
55	E. R. Wells		1	1		Scouting-belt	Scouting-belt	1			1	
56	C. H. Carlton	1		1		....do	....do					
57	O. W. Budd	1		1		Pouch	Box No. 1		1	1		Do.
58	A. E. Wood	1			1				1	1		
59	A. P. Morrow		1		1		Box No. 1		1	1		
60	C. Mauck	1		1		Cartridge-vest			1			
61	Wesley Merritt	1			1	Scouting-belt	Scouting-belt				1	
62	Henry E. Noyes	1			1	....do	Box No. 1	1		1		Do.
63	Alexander Sutorius	1			1	Pouch	....do	1		1		N. N. W. Company
64	S. B. M. Young		1		1	do	....do				1	
65	Thomas C. Devin	1		1		Scouting-belt	Scouting-belt			1		
66	G. W. Schofield											
67	Byron Dawson		1	1				1				Burden.
68	Charles Meinhold	1			1	Scouting-belt	Box No. 1				1	
69	F. S. Dodge		1	1		....do	Scouting-belt		1	1		
70	Michael Cooney		1	1		....do	Box No. 1			1	1	
71	Nicholas Nolan		1	1		....do	Pouch			1	1	
72	Anson Mills					....do					1	N. W. N. Company.
73	Andrew J. Alexander		1		1	Pouch	Pouch		1	1	1	
74	A. B. Kauffman		1		1	Scouting-belt	Scouting-belt			1		
75	William W. Tyler			1					1	1		
76	John Q. Adams	1		1		Scouting-belt	Box No. 1	1		1		Burden.
77	Peter M. Boehm			1		Pouch	....do		1	1		Do.
78	Samuel S. Sumner	1			1							Do.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Saber-slings attached to waist-belt by two straps at one point, or by attachment from two separate points.		Pistol-holster.		Recommendations in regard to the carrying of the ammunition.		Mountain-howitzer forge.		Proposed transportation of the portable forge in a two-wheeled vehicle.		What manufacture of horseshoes preferred.
		Attachment by two straps at one point, Stuart's attachment—in favor of.	Attachment from two separate points—in favor of.	Flap. In favor of.	Strap. In favor of.	For use in field.	For use in garrison.	In favor of.	Against.	In favor of.	Against.	
79	George A. Custer	1	.....	1	.....	Pouch	Pouch	.....	.....	.....	.....	Burden.
80	Myles Moylan	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
81	George W. Yates	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
82	William Thompson	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
83	Donald McIntosh	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
84	Thomas W. Custer	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
85	John F. Weston	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
86	Thomas M. McDougall	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
87	Benjamin H. Hodgson	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
88	Charles A. Varnum	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
89	George D. Wallace	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
90	William T. Craycroft	1	.....	1	.....	....do	....do	.....	.....	.....	.....	Do.
91	G. C. Doane	.....	1	.....	1	Scouting-belt	Scouting-belt	1	.....	.....	1	N. W. N. Company.
92	E. G. Mathey	.....	1	1	.....	Pouch	Pouch	1	.....	1	.....	Burden.
93	William H. Brown	.....	1	.....	1	Scouting-belt	Scouting-belt	.....	.....	.....	.....	Harden.
94	Robert P. Wilson	.....	1	1	.....	....do	Box No. 1	.....	.....	.....	.....	Harper's patent.
95	Edmund Luff	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....
96	James G. MacAdams	1	.....	.....	1	Belt	Scouting-belt	.....	.....	1	.....	Burden.
97	N. B. Sweitzer	1	.....	1	.....	Scouting-belt	....do	.....	.....	.....	.....	.....
98	Lewis Thompson	.....	1	1	.....	....do	....do	.....	.....	.....	1	Do.
99	G. L. Tyler	.....	1	.....	1	....do	....do	.....	.....	1	.....	Do.
100	A. B. Wells	.....	1	.....	1	.....	.....	.....	.....	.....	1	Do.
101	James Egan	1	.....	1	.....	Scouting-belt	Box No. 1	1	.....	.....	1	Do.
102	James F. Wade	1	.....	.....	1	.....	.....	.....	1	1	.....	.....
103	William Gerhard	1	.....	.....	.....	.....	.....	.....	1	1	.....	Do.
104	Francis Moore	.....	.....	.....	1	.....	.....	.....	1	1	.....	Do.

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105	John T. Morrison		1			Scouting-belt	Box No. 1	1		1		
106	Thomas Little		1			do	do	1		1		
107	Thomas J. Spencer		1			do	do	1		1		
108	Thomas C. Lebo		1			do	do	1		1		
109	George H. Evans		1			do	do	1		1		
110	Frank P. Reap		1			do	do	1		1		
111	James F. Randlett		1			do	do		1		1	
112	Elmer Otis	1		1		Pouch	Pouch			1		Goodenough.
113	J. G. Trimble	1		1		Scouting-belt	Scouting-belt	1		1		Do.
114	Edw. S. Godfrey	1		1		do	do			1		Burden.
115	Sebastian Gunther	1			1	do	do			1		Do.
116	Eug. A. Carr		1	1		do	do				1	Do.
117	Charles C. Cresson		1	1		do	do	1		1		Goodenough.
118	C. C. C. Carr	1			1	Box K	Box K	1			1	Do.
119	Oscar Hagen		1			Scouting-belt		1		1		
120	S. D. Sturgis									1		Burden.
121	F. K. Upham	1			1	Scouting-belt	Scouting-belt	1		1		Do.
122	Moses Harris	1			1	Pouch	Pouch	1		1		Do.
123	Charles D. Parkhurst				1	Scouting-belt	Scouting-belt			1		Rhode Island.
124	A. E. Latimer		1	1		do	Box No. 1		1	1		Burden.
125	R. H. Montgomery		1		1	do	do					Do.
126	George A. Drew		1			do		1		1		Do.
127	N. A. M. Dudley		1		1	do	Box No. 1	1			1	Do.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	What manufacture of horseshoe-nails preferred.	Horseshoes.	
			What sizes to be issued, and what proportion of each size.	What amount necessary for a six months' supply.
1	William B. Royall			
2	Henry Wagner	N. W. N. Company	25 per cent., No. 1; 25 per cent., No. 2; 50 per cent., No. 3	1,400 pounds.
3	Joseph Kerin	Globe	15 per cent., No. 1; 50 per cent., No. 2; 35 per cent., No. 3	
4	A. P. Caraher			
5	L. H. Orleman	Globe	45 per cent., No. 2; 45 per cent., No. 3; 10 per cent., No. 4	
6	R. H. Pratt	N. W. N. Company	25 per cent., No. 1; 50 per cent., No. 2; 25 per cent., No. 3	
7	Abraham K. Arnold			
8	Robert G. Smither			
9	Theo. Baldwin			
10	S. T. Norvell		25 per cent., No. 1; 50 per cent., No. 2; 25 per cent., No. 3	
11	J. W. Davidson	Globe	40 per cent., No. 2; 50 per cent., No. 3; 10 per cent., No. 4	1,720 pounds.
12	John B. Vande Wiele	do	50 per cent., No. 2; 50 per cent., No. 3	1,500 shoes.
13	E. J. Spaulding	N. W. N. Company	Nos. 1, 2, and 3, equal proportions	1,200 shoes.
14	D. Madden	Globet	15 per cent., No. 1; 50 per cent., No. 2; 35 per cent., No. 3	
15	Lewis Merrill			
16	A. G. Brackett			
17	H. W. Wessels, jr	Putnam	Nos. 2, 3, and 4, equal proportions	1,200 pounds.
18	James Oakes	Globe	8 per cent., No. 1; 44 per cent., No. 2; 44 per cent., No. 3; 4 per cent., No. 4.	
19	James Biddle	do		
20	A. D. King			1,000 pounds.
21	Thomas H. Neill	N. W. N. Company		
22	C. E. Compton	Globe	Nos. 2 and 3, equal proportions	1,200.
23	William Harper, jr		19 per cent., No. 1; 45 per cent., No. 2; 36 per cent., No. 3	1,500.
24	John Mix	N. W. N. Company	do	
25	William H. Andrews	Putnam	20 per cent., No. 2; 60 per cent., No. 3; 20 per cent., No. 4	1,000 pounds.
26	Thomas B. Dewees		25 per cent., No. 1; 50 per cent., No. 2; 25 per cent., No. 3	1,600 pounds.
27	G. Russell	N. W. N. Company	30 per cent., No. 2; 60 per cent., No. 3; 10 per cent., No. 4	1,000.
28	H. H. Crews		20 per cent., No. 1; 50 per cent., No. 2; 30 per cent., No. 3	2,000 pounds.
29	William B. Kennedy			
30	John Lee		35 per cent., No. 1; 65 per cent., No. 2	
31	John P. Hatch			
32	B. H. Grierson	Globe	25 per cent., No. 1; 50 per cent., No. 2; 25 per cent., No. 3	
33	Thomas McGregor	do	Nos. 2 and 3, equal proportions	1,200 pounds.
34	C. B. McLellan	do	35 per cent., No. 2; 65 per cent., No. 3	
35	A. D. B. Smead	N. W. N. Company	Nos. 1, 2, and 3, equal proportions	
36	D. S. Gordon	do	230, No. 1; 500, No. 2; 300, No. 3; 170, No. 4	1,200 pounds.
37	Joseph Lawson	Globe	Nos. 2 and 3, equal proportions	1,200 pounds.
38	J. I. Gregg	do	5 per cent., No. 1; 45 per cent., No. 2; 45 per cent., No. 3; 5 per cent., No. 4.	

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39	Emmet Crawford	Putnam	49 per cent., No. 2; 49 per cent., No. 3; 2 per cent., No. 4	1,425.
40	T. C. Tupper	Globe	Nos. 2 and 3, equal proportions	1,400 pounds.
41	Washington L. Elliott			
42	J. Scott Payne	Globe	Nos. 2 and 3, equal proportions	900 pounds.
43	S. M. Whitside	....do	.....do	
44	C. G. Gordon	N. W. N. Company	7 per cent., No. 1; 30 per cent., No. 2; 25 per cent., No. 3; 5 per cent., No. 4.	675.
45	Alvan C. Gillem	Globe		
46	J. McAllister		Nos. 2 and 3, equal proportions	1,000 pounds.
47	John V. Du Bois			
48	William R. Harmon	Globe	38 per cent., No. 2; 45 per cent., No. 3; 17 per cent., No. 4	1,800 pounds.
49	H. E. Tutherly	....do	75 per cent., No. 2; 25 per cent., No. 3	
50	Frank U. Robinson		20 per cent., No. 1; 60 per cent., No. 2; 20 per cent., No. 3	1, 200.
51	Charles D. Viele	Globe	40 per cent., No. 2; 50 per cent., No. 3; 10 per cent., No. 4	1, 720 pounds.
52	William McCleave	....do	Nos. 2 and 3, equal proportions	
53	R. F. Bernard	U. B. Dobbins	20 per cent., No. 1; 60 per cent., No. 2; 20 per cent., No. 3	1, 080 pounds.
54	Louis T. Morris	Globe	Nos. 2 and 3, equal proportions	
55	E. R. Wells		20 per cent., No. 1; 60 per cent., No. 2; 20 per cent., No. 3	
56	C. H. Carlton			
57	O. W. Budd	Globe	40 per cent., No. 1; 40 per cent., No. 2; 20 per cent., No. 3	1, 000 pounds.
58	A. E. Wood	....do	.....do	500 pounds.
59	A. P. Morrow			
60	C. Mauck		20 per cent., No. 1; 50 per cent., No. 2; 30 per cent., No. 3	2, 000 pounds.
61	Wesley Merritt			
62	Henry E. Noyes	N. W. N. Company	40 per cent., No. 2; 40 per cent., No. 3; 20 per cent., No. 4	1, 000 pounds.
63	Alexander Sutorius	Globe	10 per cent., No. 1; 40 per cent., No. 2; 40 per cent., No. 3; 10 per cent., No. 4.	2, 000 pounds.
64	S. B. M. Young	....do	Nos. 2 and 3, equal proportions	
65	Thomas C. Devin			
66	G. W. Schofield			
67	Byron Dawson	N. W. N. Company	20 per cent., No. 1; 35 per cent., No. 2; 35 per cent., No. 3; 10 per cent., No. 4.	600 pounds.
68	Charles Meinhold	....do	13 per cent., No. 1; 58 per cent., No. 2; 29 per cent., No. 3	1, 400 pounds.
69	F. S. Dodge			
70	Michael Cooney		40 per cent., No. 1; 40 per cent., No. 2; 10 per cent., No. 3; 10 per cent., No. 4.	1, 000 pounds.
71	Nicholas Nolan			
72	Anson Mills	N. W. N. Company	25 per cent., No. 2; 50 per cent, No. 3; 25 per cent., No. 4	
73	Andrew J. Alexander		Nos. 2 and 3, equal proportions	
74	A. B. Kauffman		Nos. 1 and 2, equal proportions	
75	William W. Tyler	Globe	13 per cent., No. 1; 75 per cent., No. 2; 12 per cent., No. 3	1, 200 pounds.
76	John Q. Adams	Putnam	50 per cent., No. 2; 40 per cent., No. 3; 10 per cent., No. 4	1, 200 pounds.
77	Peter M. Boehm	Globe	40 per cent., No. 1; 40 per cent. No. 2; 20 per cent., No. 3.	
78	Samuel S. Sumner	Griffin—6, 7, 8	8 per cent., No. 1; 42 per cent., No. 2; 42 per cent., No. 3; 8 per cent., No. 4.	1, 200 pounds.
79	George A. Custer	Globe	29 per cent., No. 1; 42 per cent., No. 2; 29 per cent., No. 3	
80	Myles Moylan	....do	.....do	
81	George W. Yates	....do	.....do	
82	William Thompson	....do	.....do	
83	Donald McIntosh	....do	.....do	
84	Thomas W. Custer	....do	.....do	
85	John F. Weston	....do	.....do	
86	Thomas M. McDougall	....do	.....do	
87	Benjamin H. Hodgson	....do	.....do	
88	Charles A. Varnum	....do	.....do	
89	George D. Wallace	....do	.....do	
90	William T. Craycroft	....do	.....do	

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	What manufacture of horseshoe-nails preferred.	Horseshoes.	
			What sizes to be issued, and what proportion of each size.	What amount necessary for a six months' supply.
91	G. C. Doane	Putnam	10 per cent., No. 1; 45 per cent., No. 2; 45 per cent., No. 3	
92	E. G. Mathey	N. W. N. Company	do	
93	William H. Brown	Union Pacific		
94	Robert P. Wilson	A. Graham	50 per cent., No. 1; 50 per cent., No. 2	2,500 pounds.
95	Edmund Luff			
96	James G. MacAdams	N. W. N. Company	25 per cent., No. 1; 50 per cent., No. 2; 25 per cent., No. 3	
97	N. B. Sweitzer			
98	Lewis Thompson	N. W. N. Company	25 per cent., No. 1; 50 per cent., No. 2; 25 per cent., No. 3	400 pounds.
99	G. L. Tyler	do		1,200 shoes.
100	A. B. Wells	Putnam		800 pounds.
101	James Egan	Burden		1,200.
102	James F. Wade	Globe		
103	William Gerhard	do		1,200 pounds.
104	Francis Moore	do	250, No. 1; 750, No. 2; 200, No. 3	1,200 pounds.
105	John T. Morrison			
106	Thomas Little			
107	Thomas J. Spencer			
108	Thomas C. Lebo			
109	George H. Evans			
110	Frank P. Reap			
111	James F. Randlett	Globe		
112	Elmer Otis	Putnam	¼ No. 1; ⅜ No. 2; ⅜ No. 3	300 pounds.
113	J. G. Trimble	do		300 pounds.
114	Edw. S. Godfrey	N. W. N. Company	300, No. 1; 200, No. 2; 100, No. 3	600 pounds.
115	Sebastian Gunther	Globe	50 per cent., No. 1; 50 per cent., No. 2	800 pounds.
116	Eug. A. Carr	Ausable		
117	Charles C. Cresson	Goodenough		1,200 pounds.
118	C. C. C. Carr	do		
119	Oscar Hagen	Globe		
120	S. D. Sturgis	do	Nos. 2, 3, and 4, equal proportions	
121	F. K. Upham	Putnam		
122	Moses Harris	do		
123	Charles D. Parkhurst	do	25 per cent., No. 1; 50 per cent., No. 2; 25 per cent., No. 3	1,200.
124	A. E. Latimer	Globe	600, No. 1; 400, No. 2; 200, No. 3	1,200.
125	R. H. Montgomery	Graham	15 per cent., No. 1; 15 per cent., No. 2; 35 per cent., No. 3	600 pounds.
126	George A. Drew	Putnam	65 per cent., No. 2; 35 per cent., No. 3	
127	N. A. M. Dudley	Globe	50 per cent., No. 2; 50 per cent., No. 3	1,200 pounds.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Additions or changes proposed in kind and amount in the saddlers' tools.	Additions or changes proposed in kind and amount in the smiths' tools.	Saddlers' horse, separate clamp.		Additions or changes proposed in saddlers' materials for a six months' supply.
				In favor of retaining it.	In favor of dispensing with it.	
1	William B. Royall				1	Increased issue.
2	Henry Wagner		Add 2 toe-knives	1		Bridle-leather increased 100 per cent.
3	Joseph Kerin				1	
4	A. P. Caraher				1	Increase of leather.
5	L. H. Orleman	More awl-handles and straight punches	Add 1 shoeing-hammer and 1 rasp per month.	1		Amount of leather doubled.
6	R. H. Pratt			1		Increased issue.
7	Abraham K. Arnold					
8	Robert G. Smither			1		Double amount of material; six times the amount of leather.
9	Theodore A. Baldwin			1		Increased issue.
10	S. T. Norvell					100 pounds leather; 5 pounds copper rivets and burrs.
11	J. W. Davidson	More awl-handles and straight punches				Increased issue.
12	John B. Vande Wiele				1	Present supply doubled.
13	E. J. Spaulding	1 saddlers' horse; hand-punches, from 1 to 12; 1 rounding-iron; 1 pair shears.	75 pounds iron; 10 pounds cast-steel; ½ dozen rasps; 6 assorted files; 2 paring-knives.		1	1 paper tacks, 6 and 12; 1 pound copper rivets and burrs, ¾-inch; 2 pounds copper rivets and burrs, ½-inch; 25 yards webbing; 150 pounds harness and 50 pounds bridle-leather.
14	D. Madden				1	
15	Lewis Merrill				1	Increased issue of rivets and burrs.
16	A. G. Brackett				1	Increased issue.
17	H. W. Wessels, jr				1	Increased issue of bridle-leather.
18	James Oakes	More needles			1	Increased issue of harness and bridle leather.
19	James Biddle					
20	A. D. King		12 horseshoe-rasps	1		8 sides bridle-leather; 60 pounds harness-leather; 8 papers tacks; 3 papers copper rivets and burrs; 1 pound black wax; ½ pound beeswax; 3 pounds shoe-thread; 2 pounds patent linen-thread.
21	Thomas H. Neill					150 pounds harness-leather; 200 pounds bridle-leather.
22	C. E. Compton		½ dozen round files, 1½-inch wide, 15 inches long.			Increase of harness and bridle leather.
23	William Harper, jr			1		60 pounds harness-leather; 50 pounds bridle-leather; 6 papers tacks, 6 and 12; 6 dozen ½-inch roller-buckles.
24	John Mix			1		

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto attached.	Names of officers.	Additions or changes proposed in kind and amount in the saddlers' tools.	Additions or changes proposed in kind and amount in the smiths' tools.	Saddlers' horse, separate clamp.		Additions or changes proposed in saddlers' materials for a six months supply.
				In favor of retaining it.	In favor of dispensing with it.	
25	William H. Andrews	3 patent awls; needles, No. 3; oil-can; scissors; glass slicker; canvas-needles; 1 collar-palm; 1 counter-punch.	4 rasps; 3 farrier-knives	.....	1	6 pounds shoe-thread, Barbour black, No. 3; 1 paper tacks, 10; 3 pounds black wax; 30 pounds bridle-leather; 25 pounds harness-leather; collar-leather; needles; 1 pound ½-inch copper rivets and burrs; 1 ticking-apron; 1 pint sweet-oil; ½ pound copperas.
26	Thomas B. Dewees	.....	.....	1	.....	Increase of leather and copper rivets and burrs.
27	G. Russell	.....	.....	.....	1	6 pounds shoe-thread; 2 pounds linen thread; 2 pounds beeswax; 3 pounds black wax; 30 pounds bridle-leather; 100 pounds harness-leather; 4,000 tacks, 6 and 12; 6 pounds copper rivets and burrs; 50 bar-buckles, ¾-inch; 70 half-round buckles, ¾-inch; 50 bar-buckles, 1¼-inch; 30 halter-rings; 50 roller-buckles, 1¼-inch; 1 bolt girth-webbing; 2 galls. Collins' oil.
28	H. H. Crews	.....	.....	1	.....	Increase of leather.
29	William B. Kennedy	.....	.....	1	.....	Do.
30	John Lee	.....	.....	.....	1	3 to 4 sides bridle-leather; 100 pounds harness-leather.
31	John P. Hatch	.....	.....	.....	.....	60 pounds bridle-leather; 120 pounds harness-leather; 6 pounds copper rivets and burrs; 6 gallons neat's-foot oil.
32	B. H. Grierson	.....	.....	.....	1	
33	Thomar McGregor	Collar-palm	6 rasps; 1 knife	.....	1	25 pounds bridle-leather; 35 pounds harness-leather.
34	C. B. McLellan	.....	.....	.....	1	Increase of leather and neat's-foot oil.
35	A. D. B. Smead	.....	6 rasps	1	.....	30 pounds harness and 20 pounds bridle leather.
36	D. S. Gordon	.....	Increase of rasps and shoeing-knives.	1	.....	250 pounds harness and 100 pounds bridle leather; 1 gross buckles, 1¼-inch; 1 gross halter-squares; ½ gross ¾-inch buckles.
37	Joseph Lawson	.....	.....	.....	1	Increase of leather.
38	J. I. Gregg	.....	Better quality of tools	.....	1	Amount of leather doubled.
39	Emmet Crawford	.....	3 rasps; 1 pair tongs; 1 hammer; 2 shoeing-knives; 1 whetstone; 1 pointing-hammer.	1	.....	30 pounds harness-leather.
40	T. C. Tupper	.....	6 rasps; and 6 half-round files	.....	1	Increase of leather and copper rivets and burrs.
41	Washington L. Elliott	.....	.....	.....	.....	
42	J. Scott Payne	.....	.....	.....	.....	75 pounds bridle and harness leather; 4 dozen assorted buckles.
43	S. M. Whitside	.....	.....	.....	1	Increase of leather.

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44	C. G. Gordon				1	200 pounds harness and 150 pounds bridle leather.
45	Alvan G. Gillem	Collar-palm	2 toe-knives and ½ doz. rasps	1		Increase of leather; 2 pounds ¾-inch copper rivets and burrs, 10 and 12.
46	J. McAllister	2 shoe-knives; 1 collar-palm; 2 collar-needles; 1 thimble.			1	5 pounds shoe-thread; 4 pounds linen thread; 14 papers tacks; ½ pound beeswax; 70 pounds bridle-leather; 85 pounds harness-leather; 11 pounds copper rivets and burrs.
47	John V. Du Bois		6 rasps	1		Increase of leather.
48	William R. Harmon		1 shoeing-hammer; 2 rasps	1		Twice the amount now issued necessary.
49	H. E. Tutherly		6 rasps and 1 toe-knife		1	55 pounds harness-leather, 20 pounds bridle-leather.
50	Frank U. Robinson					Increase of leather.
51	Charles D. Viele	Increase of awl-handles and straight punches.				Double amount of the present allowance.
52	William McCleave				1	Double quantity of leather and tacks; 6 pounds copper rivets and burrs.
53	R. F. Bernard				1	35 pounds harness-leather.
54	Louis T. Morris		1 sledge-hammer		1	Three times amount of leather now issued.
55	E. R. Wells			1		6 papers tacks, 6 and 12; 5 pounds copper rivets and burrs; 2 pounds beeswax; 4 papers needles, 3, 4, 5, and 6; 3 pounds black wax; 1 paper sailmakers' needles; 100 pounds bridle-leather; 200 pounds harness-leather; 25 pounds Collins' oil.
56	C. H. Carlton					
57	O. W. Budd		Smaller hoof-knife		1	100 pounds harness and 100 pounds bridle leather.
58	A. E. Wood		Lighter hoof-knife		1	80 pounds harness and 50 pounds bridle leather.
59	A. P. Morrow				1	Double amount of bridle-leather.
60	C. Mauck			1		1 pound shoe-thread; 1 pound patent linen thread; 2 papers tacks; ½ pound beeswax; 1 pound black wax; 90 pounds bridle-leather; 185 pounds harness-leather; 11 pounds copper rivets and burrs.
61	Wesley Merritt				1	
62	Henry E. Noyes				1	Increase of leather.
63	Alexander Sutorius	1 rounding-iron	6 rasps, 14 inches long; 4 feet of 8-cornered ⅝-inch steel, for punches.		1	2 pounds shoe-thread; 1 pound patent linen thread; 40 pounds bridle-leather; 85 pounds harness-leather; 1 pound 1¼-inch copper rivets and burrs.
64	S. B. M. Young		1 sledge-hammer		1	Three times the amount of leather.
65	Thomas C. Devin			1		Double amount of leather.
66	G. W. Schofield				1	Increase of leather.
67	Byron Dawson				1	Do.
68	Charles Meinhold		6 shoeing-rasps	1		50 pounds harness, 50 pounds bridle, and 20 pounds collar leather.
69	F. S. Dodge		1 pair clinching-tongs; 1 toe-knife; 1 shoeing-hammer; more rasps.	1		Increase of leather.
70	Michael Cooney			1		Increase of leather; 5 pounds copper rivets and burrs.
71	Nicholas Nolan		Kunun's clinching-iron	1		50 pounds bridle and 75 pounds harness leather; 5 pounds copper rivets and burrs.
72	Anson Mills		6 shoeing-rasps	1		50 pounds harness, 25 pounds bridle, and 20 pounds collar leather.
73	Andrew J. Alexander				1	
74	A. B. Kauffman				1	
75	William W. Tyler				1	
76	John Q. Adams			1		

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				In favor of retaining it.	In favor of dispensing with it.	
77	Peter M. Boehm	.....	Hoof-knife to be smaller	.....	1	100 pounds harness and 100 pounds bridle leather.
78	Samuel S. Sumner	.....	.....	1	.....	20 pounds bridle and 30 pounds harness leather; 2 pounds copper rivets and burrs.
79	George A. Custer	.....	.....	1	.....	75 pounds harness and 100 pounds bridle leather.
80	Myles Moylan	.....	.....	1	.....	Do.
81	George W. Yates	.....	.....	1	.....	Do.
82	William Thompson	.....	.....	1	.....	Do.
83	Donald McIntosh	.....	.....	1	.....	Do.
84	Thomas W. Custer	.....	.....	1	.....	Do.
85	John F. Weston	.....	.....	1	.....	Do.
86	Thomas M. McDougall	.....	.....	1	.....	Do.
87	Benjamin H. Hodgson	.....	.....	1	.....	Do.
88	Charles A. Varnum	.....	.....	1	.....	Do.
89	George D. Wallace	.....	.....	1	.....	Do.
90	William T. Craycroft	.....	.....	1	.....	Do.
91	G. C. Doane	.....	.....	.....	1	Double amount of leather.
92	E. G. Mathey	Increase of awls; 1 splitting-gauge	.....	.....	1	Increase of leather.
93	William H. Brown	.....	.....	.....	1	Increase 2 pounds patent thread; 1½ pounds beeswax; 100 pounds bridle, 50 pounds harness, and 50 pounds collar leather; 5 pounds rivets and burrs.
94	Robert P. Wilson	.....	.....	.....	1	Double amount of material.
95	Edmund Luff	.....	.....	.....	1	
96	James G. MacAdams	.....	Steel-pinchers, I. K. L.; shoeing-knife; hog-skin apron.	.....	1	3 pounds patent linen thread; 3 pounds black wax; 45 pounds harness-leather; 3 pounds ½ and ¾ inch copper rivets and burrs; 3,000 Nos. 6 and 12 tacks; 15 pounds bridle-leather; 15 pounds collar-leather.
97	N. B. Sweitzer	.....	.....	.....	.....	
98	Lewis Thompson	.....	.....	1	.....	
99	G. L. Tyler	.....	Needles, Nos. 2, 3, 4	.....	1	1 paper Glover's needles; 2 pounds ½-inch copper rivets and burrs; 1 pound ¾-inch copper rivets and burrs.
100	A. B. Wells	.....	.....	.....	1	
101	James Egan	Double tickler; single tickler; patent-leather compass; patent-leather gauge; French edge-tool; 12 block-punches; rounding-iron; sandstone;	.....	.....	1	Increase of leather.

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		channeler; collar-awl; shoe-hammer; cold-chisel; sail-cloth needle; 3-cornered files; 1 pair bull-head pinchers.				
102	James F. Wade				1	
103	William Gerhard		Increase ½ dozen farriers' knives		1	100 pounds bridle and 60 pounds harness leather.
104	Francis Moore		do		1	60 pounds bridle and 100 pounds harness leather.
105	John T. Morrison					
106	Thomas Little					
107	Thomas J. Spencer					
108	Thomas C. Lebo					
109	George H. Evans					
110	Frank P. Reap					
111	James F. Randlett			1		Increase of material.
112	Elmer Otis	1 straining-fork; 1 seat-steel; 6 pricking-irons; 1 shoe-hammer; 12 stamps; 1 web-strainer; 1 slicker; 1 pr. pinchers; 1 pr. pliers; 1 rule; 2 creasers; 1 double-creaser; 12 punches; 1 rounding-iron; 1 round-knife; 1 head-knife; 1 tack-hammer; 1 claw-tool; 6 awls and handles; 1 seat-awl; 1 tickler; 1 riveting-hammer; 1 rivet-set; 1 edge-tool, No. 4; 24 seaming-needles; 24 Glovers' needles; 1 screw-driver; 1 gauge-knife; 1 splitting-gauge; 1 patent-leather gauge; 1 backing-awl; 1 collar-awl; 1 rasp; 1 channeler; 1 patent-leather compasses; 1 divider; 1 mallet; 12 pricking-wheels; 1 pricking-wheel handle; 1 stitching-horse; 6 bag-punches; 1 pair cutting-nippers; 1 vise, 5-inch jaws.		1		Increase of leather and material.
113	J. G. Trimble			1		Increase of leather and pig-skins.
114	Edw. S. Godfrey		Steel-pinchers instead of iron		1	Increase of material.
115	Sebastian Gunther		1 sledge-hammer		1	3 sides bridle-leather; 200 pounds harness-leather; 3 pounds shoe-thread; 3 pounds patent linen thread; 4,000 tacks; 100 iron buckles, assorted.
116	Eug. A. Carr	1 pad-awl; 1 creaser, lignum-vitæ; 1 patent compasses; 1 hammer, with claw; 1 patent awl-handle; 1 shoe-knife; 1 paper needles, No. 5, for patent thread; 1 sandstone; 1 hand-punch, No. 6; 1 patent rule.	1 pair clinching-tongs		1	15 pounds bridle-leather; 35 pounds harness-leather; 2 dozen cavalry buckles, 2 of each kind.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Additions or changes proposed in kind and amount in the saddlers' tools.	Additions or changes proposed in kind and amount in the smiths' tools.	Saddlers' horse, separate clamp.		Additions or changes proposed in saddlers' materials for a six months' supply.
				In favor of retaining it.	In favor of dispensing with it.	
117	Charles C. Creason			1	.....	Double amount of bridle and harness leather.
118	C. C. C. Carr			1	.....	
119	Oscar Hagen			1	.....	Double amount of leather.
120	S. D. Sturgis	1 splitting-machine		1	.....	Increase of leather.
121	F. K. Upham			1	.....	Increase of leather; double amount of material.
122	Moses Harris		1 dozen rasps	1	.....	50 pounds harness and 20 pounds bridle leather; double amount of material.
123	Charles D. Parkhurst			.....	1	Double amount of leather.
124	A. E. Latimer		1 clinching-tongs; 4-faced hand-hammer; smaller hoof-knife.	.....	1	Increase of leather; double amount of rivets and burrs.
125	R. H. Montgomery			.....	1	Double amount of leather.
126	George A. Drew			1	.....	Increase of leather.
127	N. A. M. Dudley			.....	1	Twice the amount of leather.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Is the quantity of horseshoe-nails as now issued sufficient for a six months' supply?			Collins' prepared oil.	Neat's-foot oil.	General suggestions.
		Yes.	No.	What amount necessary.	In favor of.	In favor of.	
1	William B. Royall	1					Sends drawing of curb-bit.
2	Henry Wagner		1	100 pounds			
3	Joseph Kerin					1	Issue of tripoli, emery-cloth, emery-powder, and sweet-oil.
4	A. P. Caraher	1				1	
5	L. H. Orleman	1				1	Horn combs for horses, knapsacks for soldiers' clothing.
6	R. H. Pratt		1	75 pounds			
7	Abraham K. Arnold					1	
8	Robert G. Smither		1			1	Box for clothing.
9	Theo. A. Baldwin					1	
10	S. T. Norvell	1					Nose-bags.
11	J. W. Davidson		1	Nos. 7, 8, 9, 121 pounds		1	
12	John B. Vande Wiele		1	125 pounds	1		
13	E. J. Spaulding		1	75 pounds	1		
14	D. Madden					1	Sends a bit, picket-pin, and pattern for sweat-leathers.
15	Lewis Merrill						Sends detailed answer on question No. 14.
16	A. G. Brackett		1				
17	H. W. Wessels, jr		1	125 pounds			
18	James Oakes		1			1	
19	James Biddle						
20	A. D. King		1	100 pounds	1		
21	Thomas H. Neill		1				All buckles and rings to be made of brass.
22	C. E. Compton	1					
23	William Harper, jr		1	100 pounds		1	Nose-bags; 500 sheets emery-cloth; 500 sheets sand-paper.
24	John Mix		1	80 pounds	1		Nose-bags; all metal parts of equipments to be nickel-plated.
25	William H. Andrews		1				
26	Thomas B. Dewees	1			1		
27	G. Russell					1	Issue of breast-straps and horse-blankets.
28	H. H. Crews		1	200 pounds			
29	William B. Kennedy		1			1	Sends detailed answers on questions Nos. 1 and 13.
30	John Lee		1	75 pounds			
31	John P. Hatch					1	
32	B. H. Grierson	1					Sends drawing of Kiernan's improved horseshoe.
33	Thomas McGregor	1					
34	C. B. McLellan	1				1	
35	A. D. B. Smead		1		1		Horse-blankets for northern climates.

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Continued.

Number of the original paper hereto appended.	Names of officers.	Is the quantity of horseshoe-nails as now issued sufficient for a six months' supply?			Collins' prepared oil.	Neat's-foot oil.	General suggestions.
		Yes.	No.	What amount necessary.	In favor of.	In favor of.	
36	D. S. Gordon	.....	1	75 pounds	.....	.....	
37	Joseph Lawson	.....	1	.....	1	.....	
38	J. L. Gregg	1	.....	.....	.....	.....	Properly organized pack-train and suitable equipments.
39	Emmet Crawford	.....	1	100 pounds	.....	.....	Horse-blanket, nose-bags, black leather to cover stirrups.
40	T. C. Tupper	1	.....	.....	.....	.....	
41	Washington L. Elliott	.....	.....	.....	.....	.....	Nose-bags.
42	J. Scott Payne	.....	1	75 pounds	.....	1	
43	S. M. Whitside	.....	1	75 pounds	1	.....	Tripoli, emery-cloth, emery-powder, and linseed-oil.
44	C. G. Gordon	.....	1	.....	.....	1	
45	Alvah C. Gillem	1	.....	.....	.....	1	Issue of horseshoes to be given to the Quartermaster's Department.
46	J. McAllister	.....	.....	.....	.....	.....	Do.
47	John V. Du Bois	.....	.....	.....	.....	1	Buck-gauntlets and buffalo-shoes for soldiers serving North. Sends drawing of bit.
48	William R. Harmon	1	.....	.....	.....	1	
49	H. E. Tutherly	.....	.....	.....	.....	.....	Hoods of stirrups to be one-third larger.
50	Frank U. Robinson	1	.....	.....	.....	1	Do.
51	Charles D. Viele	.....	1	121 pounds	.....	1	Old carbine-sling.
52	William McCleave	1	.....	.....	1	.....	Nose-bags, hoods, and stirrups to extend one inch lower.
53	R. F. Bernard	.....	.....	60 pounds	.....	.....	Sends pattern of scouting-belt.
54	Louis T. Morris	1	.....	.....	1	.....	Hoods to be dispensed with. Smooth spurs.
55	E. R. Wells	1	.....	.....	1	.....	Old carbine-sling. Sends pattern of scouting-belt.
56	C. H. Carlton	.....	.....	.....	.....	.....	
57	O. W. Budd	.....	1	150 pounds	.....	1	Nickel-plated bits.
58	A. E. Wood	1	.....	.....	.....	1	Howitzer-forge on a larger scale.
59	A. P. Morrow	1	.....	.....	.....	.....	
60	C. Mauck	.....	1	200 pounds	.....	.....	Issue of better leather. Sends drawing of curb-bit.
61	Wesley Merritt	.....	1	.....	.....	1	
62	Henry E. Noyes	.....	1	100 pounds	1	.....	Sends model of picket-pin, curb-bit, and lariat, made by A. I. House, first sergeant Company I, Second Cavalry.
63	Alexander Sutorius	1	.....	.....	.....	.....	All buckles and rings to be made of brass.
64	S. B. M. Young	1	.....	.....	1	.....	Hoods dispensed with; stirrups leather-covered.
65	Thomas C. Devin	.....	1	.....	.....	.....	A copy of a good work on veterinary surgery.
66	G. W. Schofield	.....	.....	.....	.....	.....	Detailed suggestions on the automatic ejector.
67	Byron Dawson	.....	1	100 pounds	.....	1	Bits nickle-plated.
68	Charles Meinhold	.....	1	.....	1	.....	
69	F. S. Dodge	1	.....	.....	.....	.....	

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70	Michael Cooney		1	100 pounds			Brass-plated bits.
71	Nicholas Nolan		1	100 pounds			Brass-plated bits and buckles.
72	Anson Mills		1		1		
73	Andrew J. Alexander						Wooden stirrups to be made 4½ inches deep. Sends pattern of curb-bit and side-lines.
74	A. B. Kauffman	1					Old carbine-sling; carbine-boot to be made to carry weight of carbine.
75	William W. Tyler		1		1		
76	John Q. Adams		1	75 pounds			
77	Peter M. Boehm		1	150 pounds		1	
78	Samuel S. Sumner		1	75 pounds		1	Brass buckles and bits.
79	George A. Custer	1				1	Nose-bags; wide sling-belt; saddle-blanket one-third larger.
80	Myles Moylan	1				1	Do.
81	George W. Yates	1				1	Do.
82	William Thompson	1				1	Do.
83	Donald McIntosh	1				1	Do.
84	Thomas W. Custer	1					Do.
85	John F. Weston	1					Do.
86	Thomas M. McDougall	1					Do.
87	Benjamin H. Hodgson	1					Do.
88	Charles A. Varnum	1					Do.
89	George D. Wallace	1					Do.
90	William T. Craycroft	1					Do.
91	G. C. Doane	1					Nose-bags; deeper stirrups.
92	E. G. Mathey		1	75 pounds			
93	William H. Brown	1					
94	Robert P. Wilson	1				1	
95	Edmund Luff				1		
96	James G. MacAdams		1	75 pounds	1		Larger saddle-blankets.
97	N. B. Sweitzer				1		
98	Lewis Thompson		1	80 pounds	1		Supplies of equipments and material left at post.
99	G. L. Tyler		1	100 pounds	1		Larger saddle-blankets. Sends pattern of scouting-belt.
100	A. B. Wells	1				1	
101	James Egan	1			1		Nickel-plated bits and link-straps.
102	James F. Wade	1				1	Nickel or brass plated bits and buckles.
103	William Gerhard	1					Hoods of stirrups to be suspended, with stirrups broader and stronger.
104	Francis Moore	1				1	
105	John T. Morrison					1	Heavier saddle-blankets.
106	Thomas Little					1	Do.
107	Thomas J. Spencer					1	Do.
108	Thomas C. Lebo					1	Do.
109	George H. Evans					1	Do.
110	Frank P. Reap					1	Do.
111	James F. Randlett		1		1		Sends drawing of curb-bit.
112	Elmer Otis				1		
113	J. G. Trimble		1		1		
114	Edw. S. Godfrey		1		1		Hoods of the stirrups to be deeper.
115	Sebastian Gunther	1				1	Add for 1 company, 6 months' supply; 4 quires emery-cloth, 6 pounds rotten stone, 1 gallon oil, 4 gallons neat's-foot or Collins' oil.
116	Eug. A. Carr		1	250 pounds	1		Stirrup-covers to be deeper, saddle-bags larger.
117	Charles C. Cresson	1				1	Nose-bag.
118	C. C. C. Carr						All buckles, rings, &c., to be made of brass.
119	Oscar Hagen	1					

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ABSTRACT G.—*Abstract of the opinions of officers, &c.*—Concluded.

Number of the original paper hereto appended.	Names of officers.	Is the quantity of horseshoe-nails as now issued sufficient for a six months' supply?			Collins' prepared oil.	Neat's-foot oil.	General suggestions.
		Yes.	No.	What amount necessary.	In favor of.	In favor of.	
120	S. D. Sturgis	.....	.....	.....	.....	.....	
121	F. K. Upham	.....	1	.....	.....	.....	Monthly supply of horseshoes and nails.
122	Moses Harris	.....	1	75 pounds	.....	.....	Saddles covered with black leather; all metal parts brass-plated.
123	Charles D. Parkhurst	.....	1	120 pounds	.....	.....	McClellan saddle-tree covered with black leather. Sends drawing of curb-bit and pistol-holster.
124	A. E. Latimer	.....	1	125 pounds	.....	.....	Detailed answer on question 13; 12 pack-mules, with saddles fitted and numbered for each company of cavalry.
125	R. H. Montgomery	1	.....	.....	.....	.....	
126	George A. Drew	.....	.....	.....	.....	.....	
127	N. A. M. Dudley	.....	1	90 pounds	1	.....	Wide single-belt; larger saddle-blankets; canvas horse-cover to be issued.

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SUMMARY PERTAINING TO ABSTRACT G.

Summary of the opinions of cavalry officers, as set forth in their answers to the questions propounded by the Board on Cavalry-Equipments.

Numbers.	Sweat-leathers and saddle-skirts.		Girth.		Fastening for girth.		Saddle-bag.		Recommendations on the curb-bit.		Light halter-chain, in addition to leather halter-strap.		Recommendations on the curry-comb.		Recommendations on the horse-brush.	
	In favor of.	Against.	Hair girth.	Present girth.	Cincha-strap fastening.	Buckle fastening.	Leather.	Canvas.			In favor of.	Against.				
1 to 127	36	85	95	28	71	56	105	19	Lighter bit	27	87	35	Strap	15	Leather back	65
.....	.....	.....	.....	.....	.....	.....	.....	.....	Present bit, (steel)	20	.....	.....	Better quality	26	Better quality of hair	34
.....	.....	.....	.....	.....	.....	.....	.....	.....	Old dragoon bit	11	.....	.....	Open back	6	Rubber back	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	Milder bit	7	.....	.....	Rubber brush-comb	2	Martin's brush	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	Shoemaker bit	7	.....	.....	Smaller size	2	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Daniels bit	7	.....	.....	Hutchings & Sons	1	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Grimsley bit	3	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Brass bit	3	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Old Kearney bit	2	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Jenifer bit	1	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Burdoon bit	1	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Straight steel branches	1	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Smaller bit	1	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Roberts bit	1	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Baldwin bit	1	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Chiffany bit	1	.....	.....	.....		.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	Baucher bit	1	.....	.....	.....		.....	
Total ..	36	85	95	28	71	56	105	19		95	87	35		52		101

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SUMMARY PERTAINING TO ABSTRACT G.—*Summary of the opinions of cavalry officers, &c.*—Continued.

Numbers.	Recommendations on change in the lariat.		Suggestions on change in the picket-pin.	Dark-blue felt saddle-cloth, &c.			Recommendations in regard to side-lines.*	Iron pins three feet long, to fasten picket-line to the ground.		Saber attached by two straps at one point—Stuart's attachment.	Slings—Attachment from two separate points.
	Horse-hair.	Change recommended.		In favor of.	Against.	Gray—in favor of.		In favor of.	Against.		
1 to 127	82	Manila rope 18	Fifteen inches long 15	76	27	3	Chains shorter 13	78	35	70	45
.....	.....	Buffalo hair 7	With swivel 12	.....	.....	.....	Chains to lengthen and shorten 8	.....	.....	.....	.....
.....	.....	Buckskin 4	Lyon's patent 9	.....	.....	.....	Hopples 4	.....	.....	.....	.....
.....	.....	With swivel 4	Steel 4	.....	.....	.....	Rope 4	.....	.....	.....	.....
.....	.....	Hempen rope 2	First sergeant Sixth Cavalry 3	.....	.....	.....	Leather 2	.....	.....	.....	.....
.....	.....	Rawhide 1	Col. James Oakes's 2	.....	.....	.....	Halter-shanks 1	.....	.....	.....	.....
.....	.....	.....	F. K. Upham's 2	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	Kiernan's 1	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	Blacksmith Mace's 1	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	A. I. House's 1	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	Twelve inches long 1	.....	.....	.....	.....	.....	.....	.....	.....
Total..	82	36	51	76	27	3	32	78	35	70	45

* Sixty-six opinions; 25 inches average length of chains.

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SUMMARY PERTAINING TO ABSTRACT G.—*Summary of the opinions of cavalry officers, &c.*—Continued.

Numbers.	Pistol-holster. Flap. In favor of.	Pistol-holster. Strap. In favor of.	Recommendations in regard to the carrying of the ammunition. For use in field.	For use in garrison.	Mountain-howitzer forge. In favor of.	Mountain-howitzer forge. Against.	Proposed transportation of forge in a two-wheeled vehicle. In favor of.	Proposed transportation of forge in a two-wheeled vehicle. Against.	What manufacture of horseshoes preferred.	What manufacture of horseshoe-nails preferred.	*What amount of horseshoes necessary for a six months' supply.	Saddler's horse—separate clamp. In favor of retaining it.	Saddler's horse—separate clamp. In favor of dispensing with it.	Is the quantity of horseshoe-nails, as now issued, sufficient for six months? Yes.	Is the quantity of horseshoe-nails, as now issued, sufficient for six months? No.	Is the quantity of horseshoe-nails, as now issued, sufficient for six months? What amount necessary.†	Collins' prepared harness-oil.	Neat's-foot-oil.
1 to 127.	61	44	Scouting-belt ..... 62 Pouch ..... 38 Cartridge-vest .... 1 Box K 1	Pouch ..... 35 Scouting-belt ..... 24 Box No. 1 ..... 28 Box No. 2 ..... 1 Box K 1	37	23	66	38	Burden ..... 60 Goodenough ..... 6 N. W. N. Co..... 3 Rhode Island ..... 3½ Perkins..... 2 Griffith ..... 1 Schöenberger & Co 1 Harper's patent.. 1	Globe..... 48 N. W. N. Co..... 13 Putnam..... 11 U. B. Dobbins..... 1 Griffin ..... 1 Graham ..... 1 Union Pacific..... 1 Ausable 1	.....	50	58	47		.....	28	44
Total.	61	44	102	 89	37	23	66	38	 77	 77	.....	50	58	47	52	.....	28	44

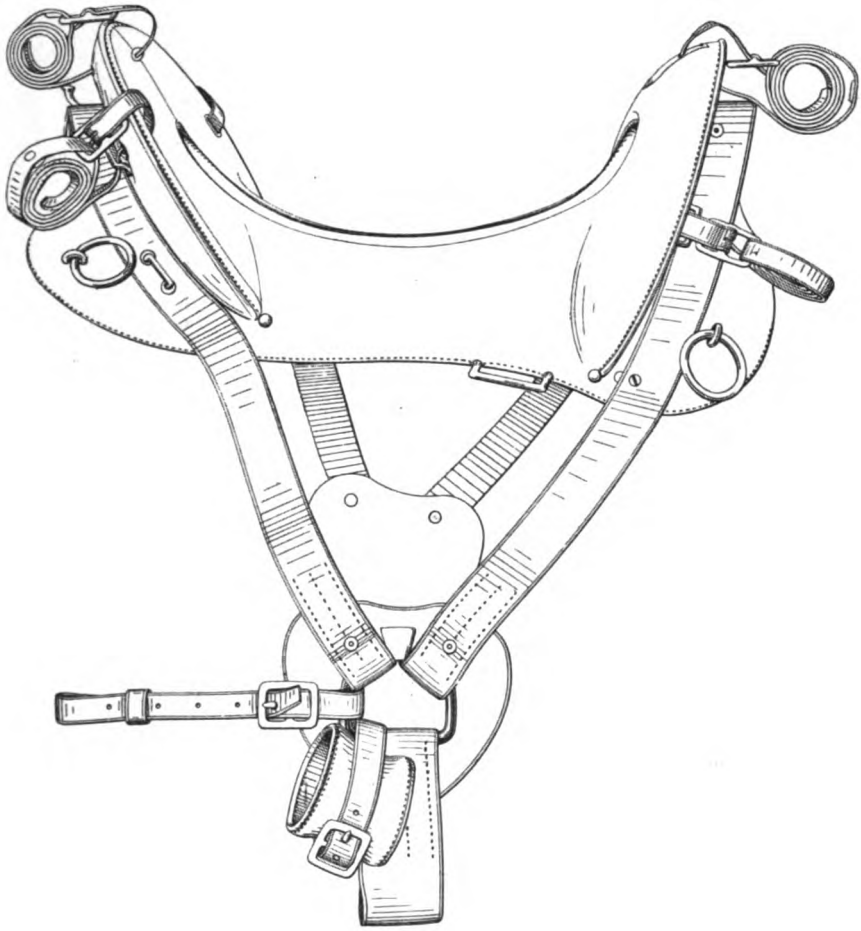
* Fifty opinions; 1,177 pounds average amount.

† Thirty-six opinions; 101 pounds average amount.

L. H. CARPENTER,
Captain Tenth Cavalry, Brevet Colonel,
Recorder of the Board on Cavalry Equipments, &c.

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SADDLE TREE, TRIMMED.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

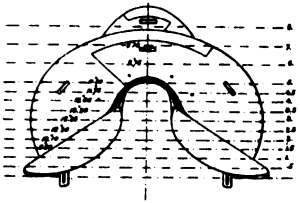
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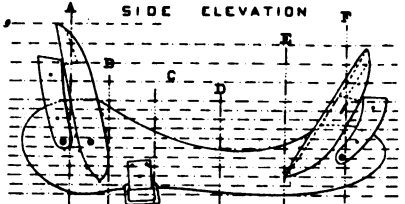
SADDLE TREE, DETAILS

PLATE 2.

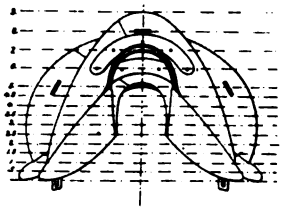
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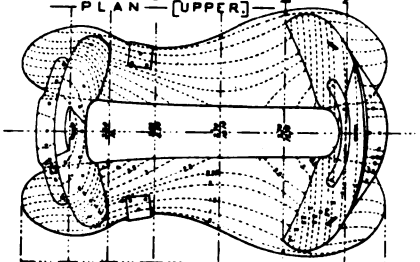
SIDE ELEVATION



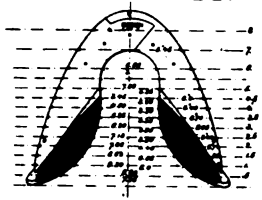
FRONT ELEVATION.



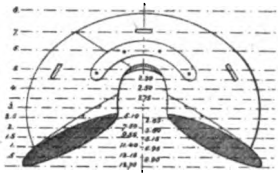
PLAN—[UPPER]



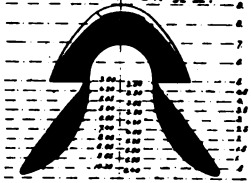
SECTION ON BB'.



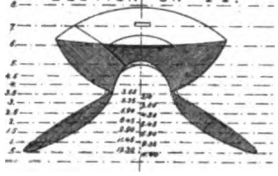
SECTION ON EE'.



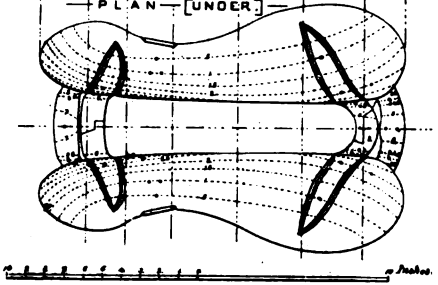
SECTION ON AA'.



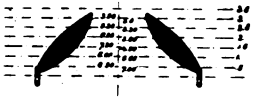
SECTION ON FF'.



PLAN—[UNDER]



SECTION ON CC'.



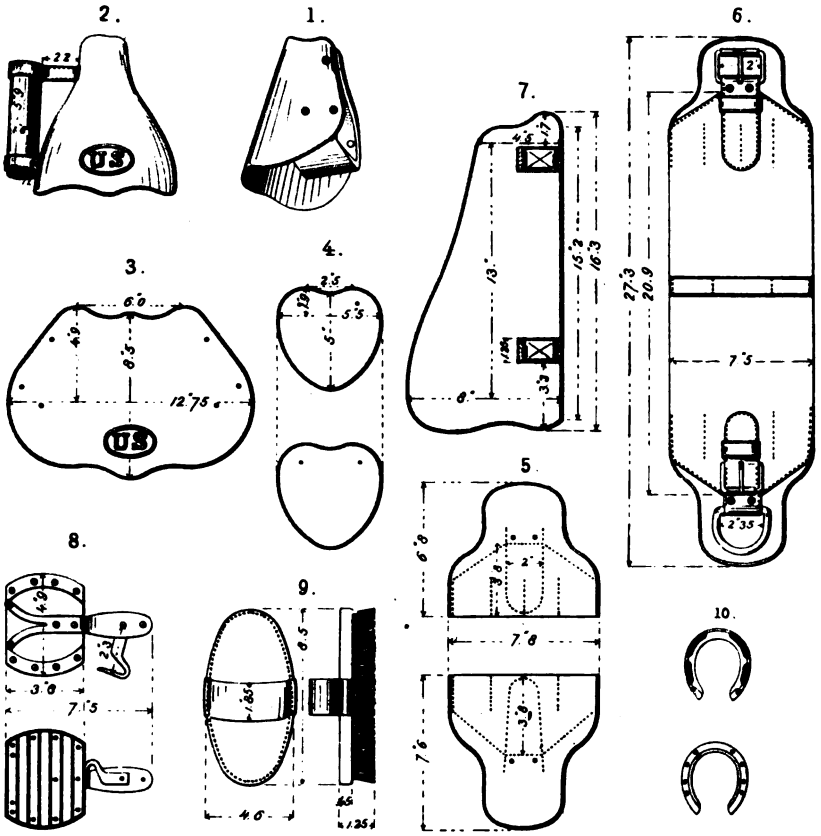
SECTION ON DD'.



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1, STIRRUP.

2, STIRRUP WITH GUIDON SOCKET.

3, HOOD FOR STIRRUP.

4, SAFE FOR D-RING ON GIRTH STRAPS.

5, SAFE FOR GIRTH.

6, GIRTH.

7, SWEAT LEATHER.

8, CURRY COMB.

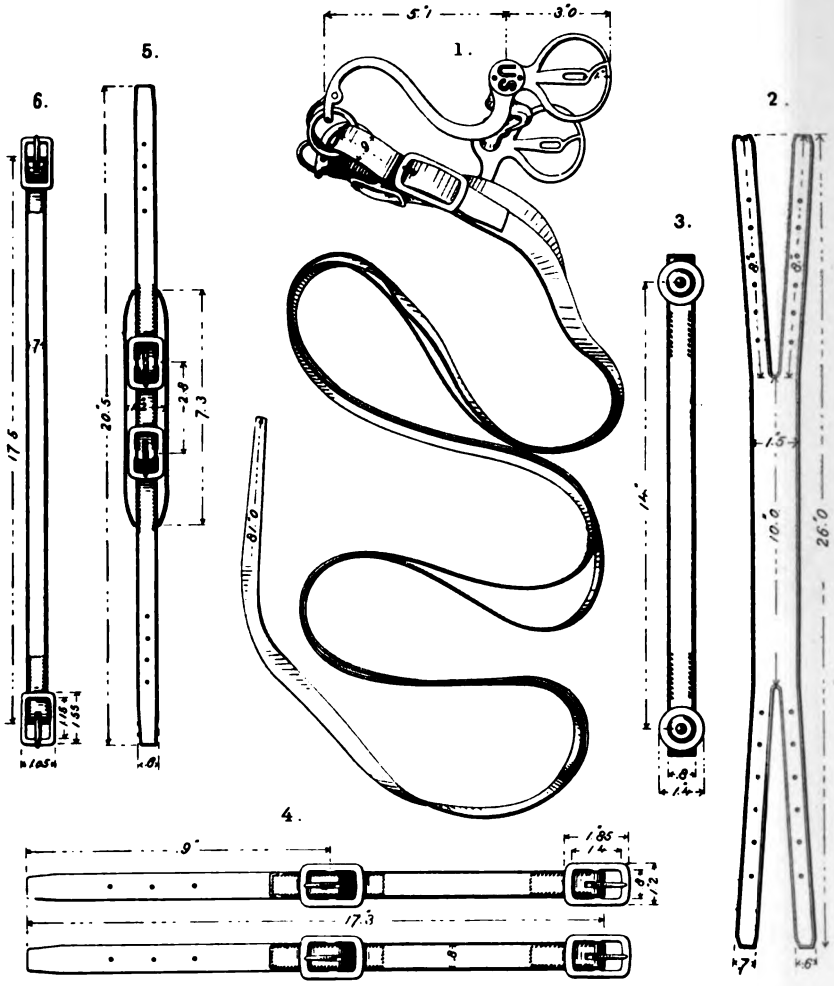
9, HORSE BRUSH.

10, HORSE SHOES.

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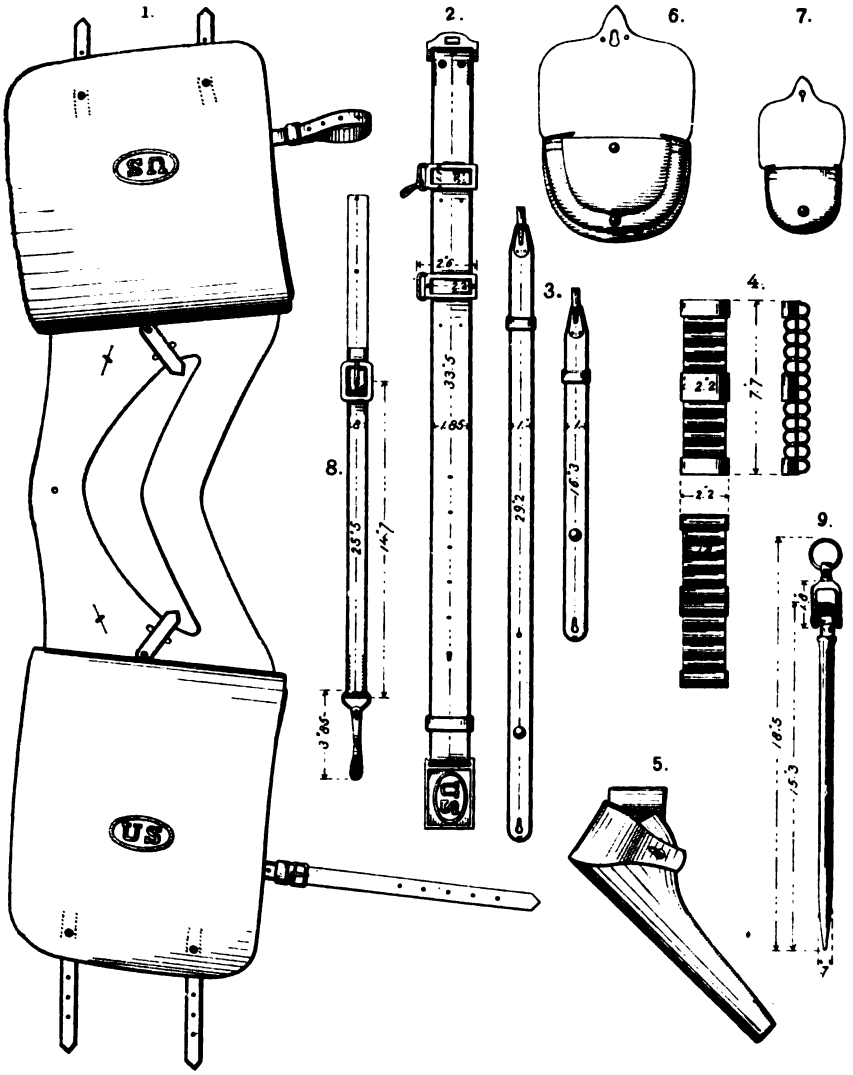
CURB BRIDLE, IN DETAIL.

1, *Bit and Reins.*
2, *Crown-piece.*
3, *Brow-band.*
4, *Cheek-pieces.*
5, *Curb-strap.*
6, *Throat-lash.*

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1, SADDLE BAGS.

2, BELT AND PLATE.

3, SABRE SLINGS.

4, MOVABLE CARTRIDGE LOOPS.

5, PISTOL HOLSTER.

6, CARBINE CARTRIDGE POUCH.

7, PISTOL CARTRIDGE POUCH.

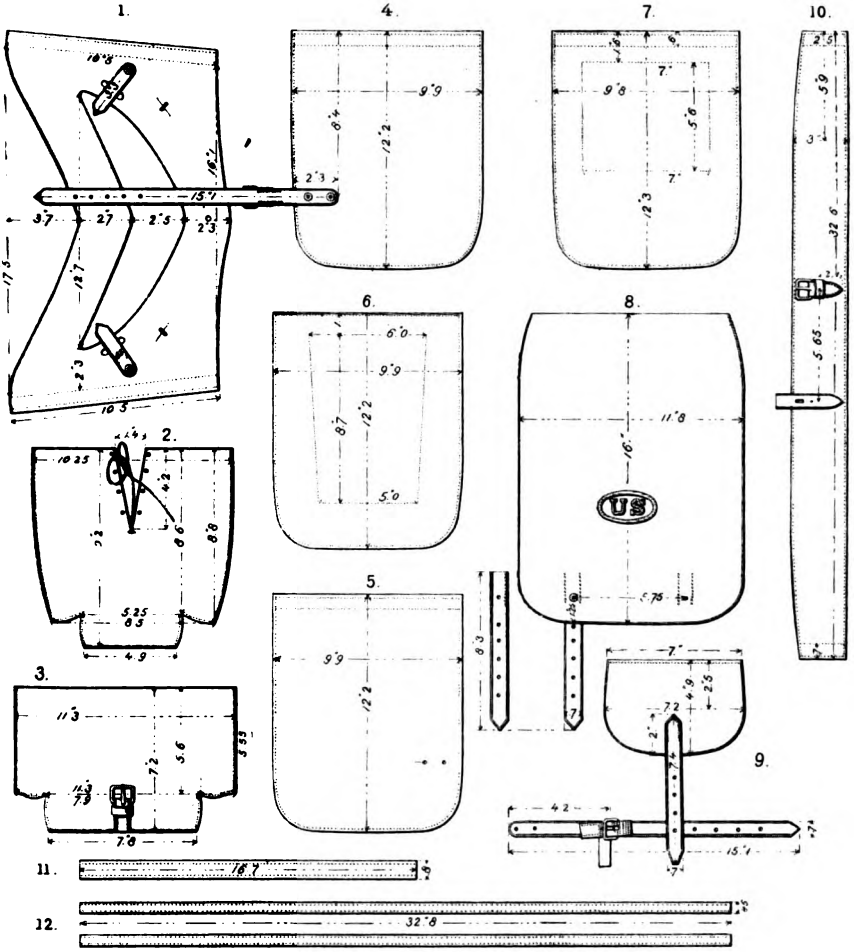
8, LINK.

9, PICKET PIN.

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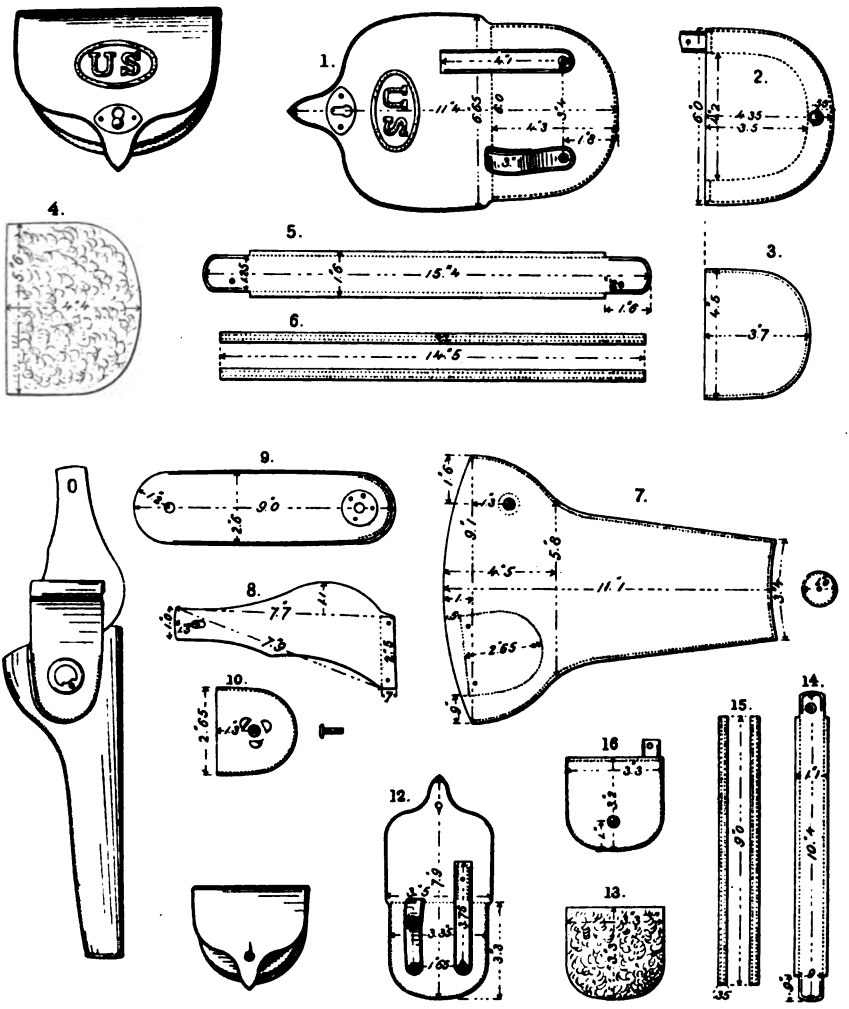
SADDLE BAGS, IN DETAIL.

1, *Seat.*
2, *Brush and Comb Pocket.*
3, *Shoe and Nail Pocket.*
4, *Back, off side.*
5, *Back, near side.*
6, *Front, off side.*
7, *Front, near side.*
8, *Flap.*
9, *Flap S. and N. Pocket.*
10, *Gusset.*
11, *Reinforce.*
12, *Wells.*

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DETAILS OF
CARBINE CARTRIDGE POUCH, PISTOL HOLSTER & PISTOL CARTRIDGE POUCH

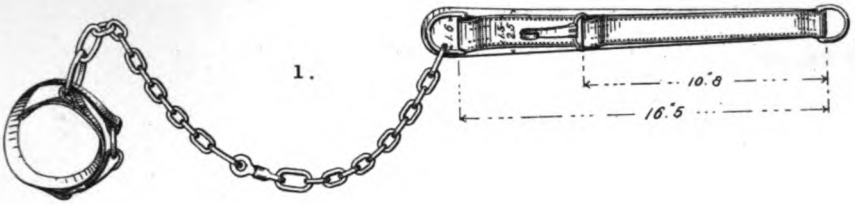
1, *Back and Flap.*
2, *Front.*
3, *Pocket.*
4, *Wool lining.*
5, *Gusset.*
6, *Welts.*
7, *Body.*
8, *Flap.*
9, *Frog.*
10, *Swivel attachment piece.*
12, *Back and Flap.*
13, *Wool lining.*
14, *Gusset.*
15, *Welts.*
16, *Front.*

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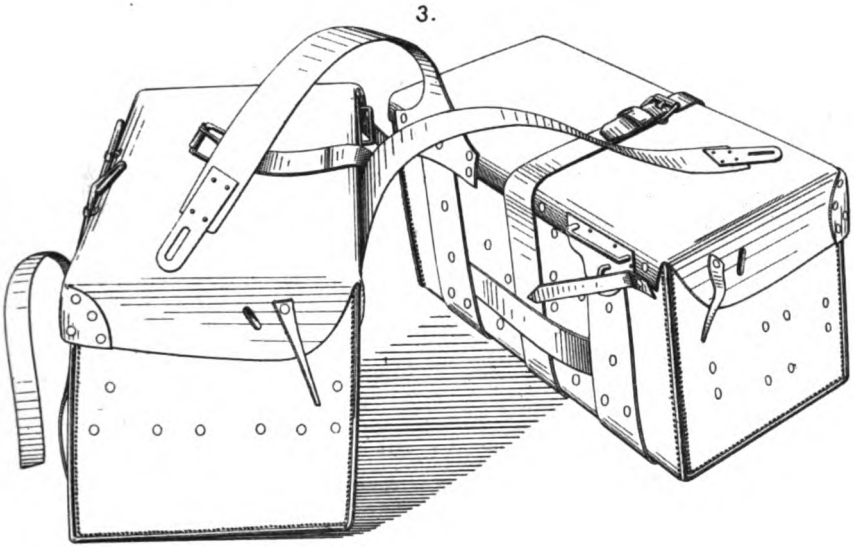
1.



2.



3.



1, SIDE LINES.

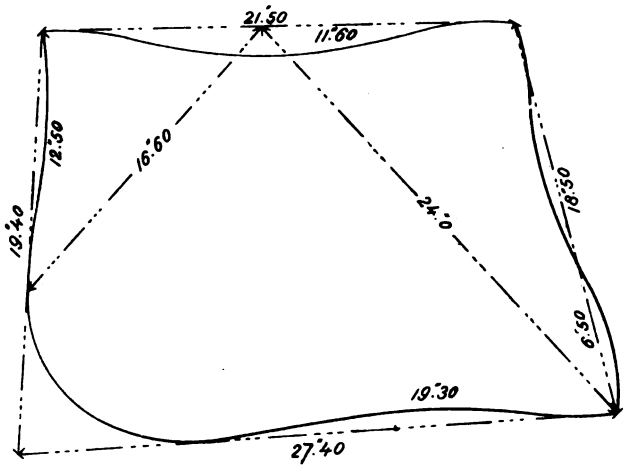
2, HALTER CHAIN.

3, TOOL BAGS

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FELT SADDLE CLOTH.

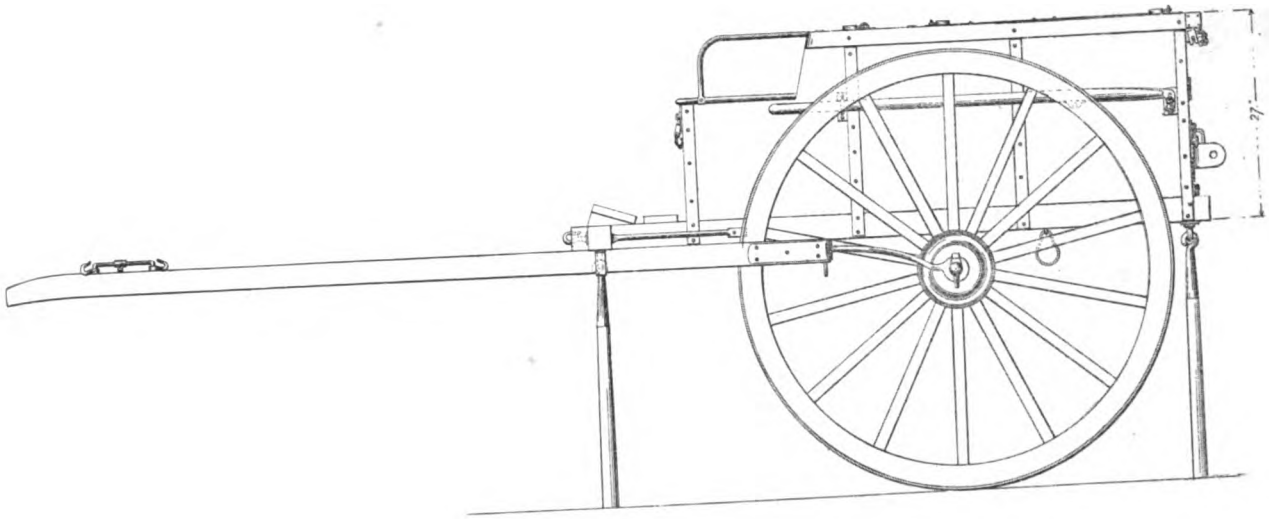
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CAVALRY FORGE CART.

PLATE 10.



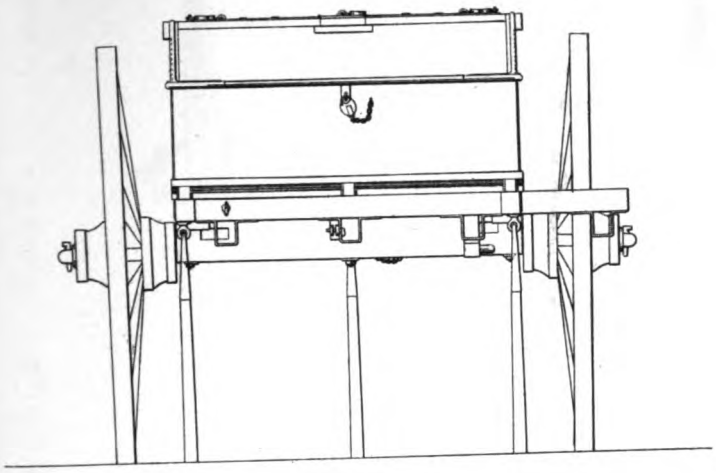
SIDE ELEVATION.

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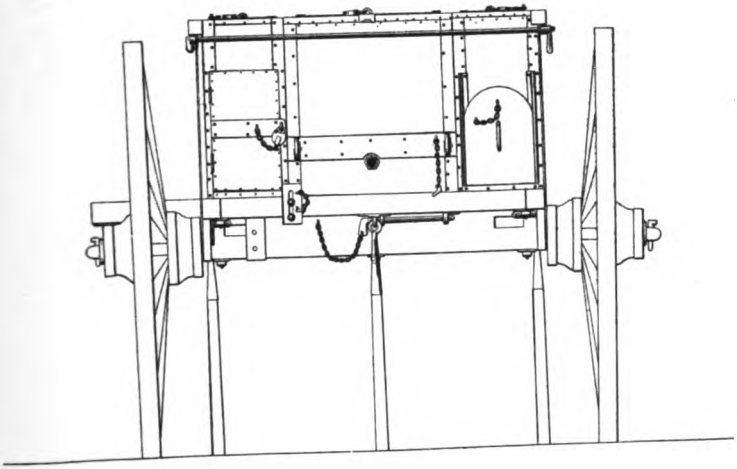
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CAVALRY FORGE CART.



FRONT ELEVATION.



REAR ELEVATION.

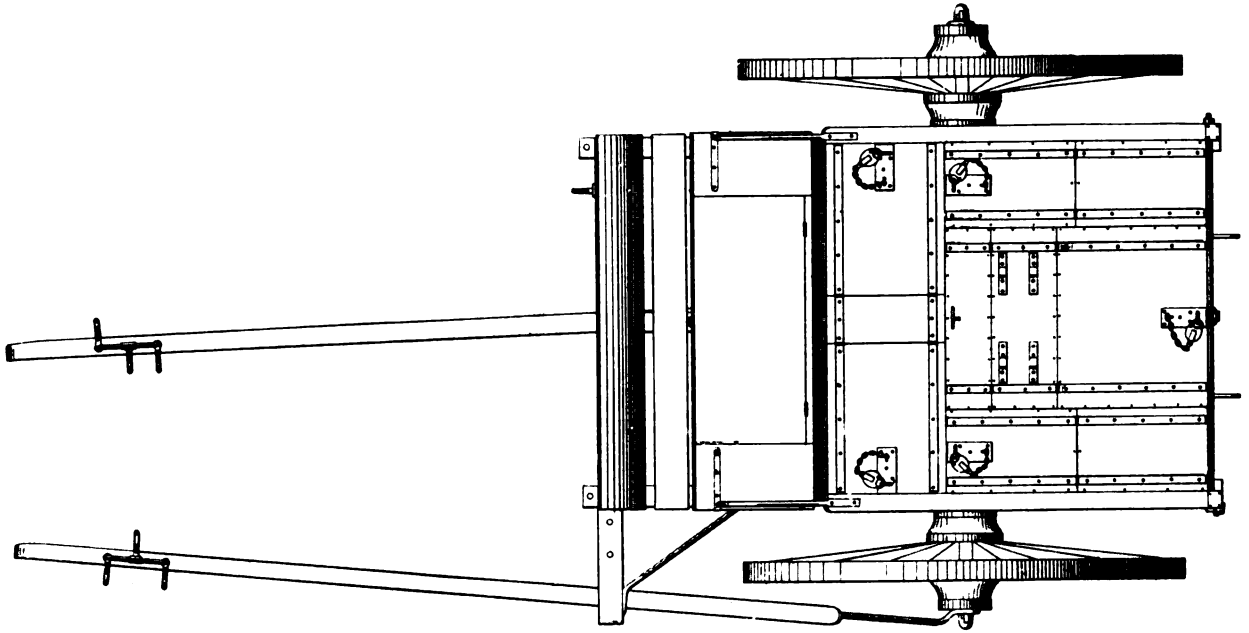
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CAVALRY FORGE CART.

PLATE 12.



PLAN.

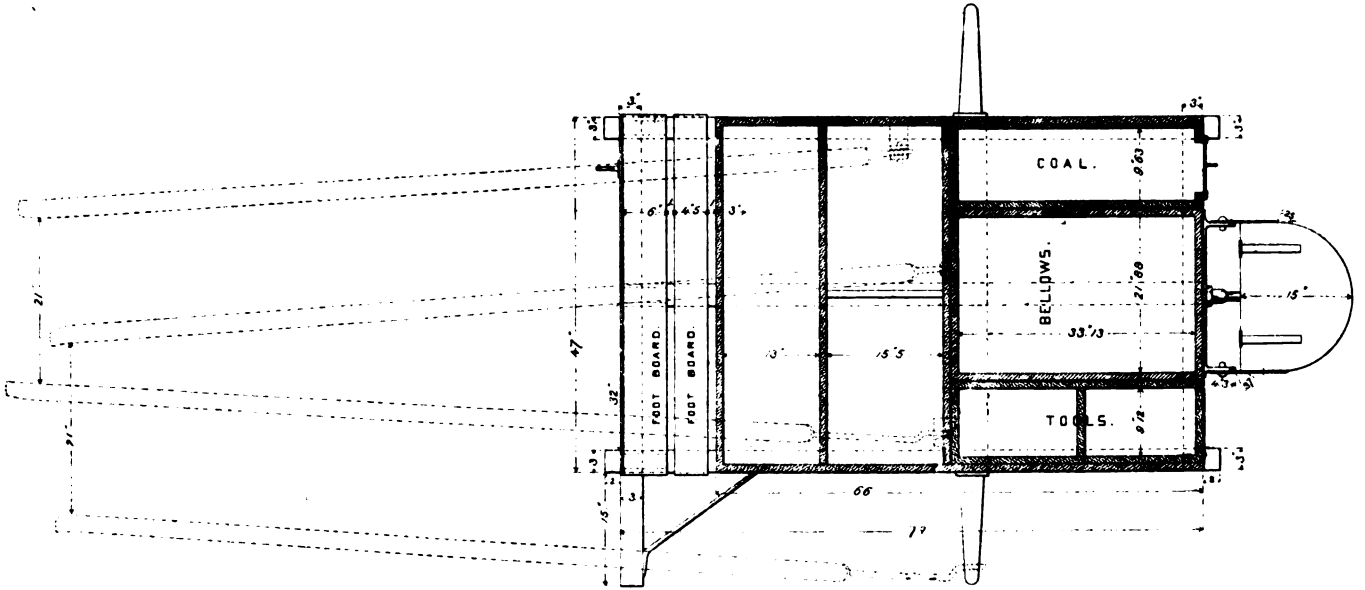
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CAVALRY FORGE CART.

PLATE 13.



HORIZONTAL SECTION.

[WITH FORGE IN POSITION.]

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APPENDIX H.

OFFICE OF U. S. ORDNANCE AGENCY AND NEW YORK ARSENAL,
New York City, July 16, 1874.

SIR: I have the honor to submit the following special report, with the accompanying documents germane thereto, regarding the operations at this agency in carrying out the orders of the Department of November 28, 1873, contemplating the improvement of the armaments of the defensive works of the harbor of New York, and growing out of the report and recommendation of this office of November 26, 1873, in response to the instructions of the Bureau of November 22, to inspect and report upon the condition of the armaments.

The most important repairs to be made under the above-mentioned instructions were the removal of existing and the provision of heavier pintle transoms, the supplying of adequate recoil-checks, and the procurement and attachment of cranes and pulleys for loading.

The accompanying report of the superintendent, Mr. A. G. Sinclair, marked I, shows the extent of the more important operations of this office in this regard. The minor repairs can be gathered from the "monthly report of the work done."

A recapitulation shows as follows:

Twenty-one 15″ chassis supplied with thick pintle-transoms (the old ones being removed) and loading cranes and pulleys. These carriages were thoroughly overhauled, repaired, and painted, and the guns lackered.

Fourteen 15″ carriages moved from forts to wharves for shipment to Fort Monroe Arsenal, to have attached pneumatic buffers, cranes, and pulleys.

Nine 15″ carriages (with pneumatic buffers, cranes, and pulleys attached) received from Fort Monroe Arsenal, moved from the wharves to the forts and placed in position.

Fourteen 15″ guns mounted and dismounted in prosecuting the above work.

Four 13″ mortars moved from the wharf to fort, and ready to be placed in position.

One recoil-check (friction) applied to a 15″ carriage and tested.

One 15″ carriage and chassis altered to give increased height, and a hydraulic buffer attached to the same, and the systems tested.

Our limited facilities for the provision of the standard recoil-checks, (pneumatic buffers,) and the importance, in consequence, of testing at once some practical, economical, and readily-applied apparatus for controlling recoil, led this office to make, under the instructions of the Department of November 28, 1873, a friction recoil-check and apply and experiment with it. The description of this check, its mode of attachment to the carriage, and the results of the experiments with it, are given in the report from this office, dated February 24, 1874, and the accompanying drawings. A copy of this report is appended, marked II; also a drawing marked VII.

It is the intention, in the alteration of two of the 10″ carriages designed for use with converted 10″ smooth-bores to rifles, to further test this cheap and simple check; using, however, an automatic device for clamping the "friction-plates," as the gun is about reaching its position in battery, and permanently attaching the "box-clamps" to the upper carriage.

It having already been determined that our standard carriages should be increased 15″ in height for barbette service over existing models at our forts, and believing that we could produce a cheaper if not a better and more graceful carriage with this improvement (than our present standard) by altering our present low carriages, retaining all the principal parts, and the making of repairs in New York Harbor of our carriages affording a favorable opportunity, I caused to be so altered a 15″ low carriage, and have tested its endurance by what may be deemed a sufficient preliminary trial.

The many advantages promised by the hydraulic buffer, especially in simplicity and economy, over the (double) pneumatic cylinders for checking recoil, also led, in view of the opportunities afforded, to the application to this carriage of an experimental hydraulic buffer, designed in its details by this office, and differing in some important particulars from the ones now in use in the Prussian and English services.

The design of this carriage of increased height with the buffer is shown in the appended drawings. The results of the trial are appended, marked III.

It will be seen that the increased height is attained by inserting six sections, (three on a side,) similar in construction to the chassis rail, between the two rails and the feet, props, and forks of the low 15″ chassis. This, it is believed, gives all the strength required, preserves a light and graceful appearance to the system, and avoids the deep and relatively thin and ungainly present rail, besides utilizing all the principal parts of the old chassis. Drawings accompany this report, marked IV, V, VI.

This construction, it is believed, can be modified, if any advantage can be gained thereby, by employing solid flanged rails of sufficient strength, in contradistinction to built-up ones. Transoms of suitable weight and dimensions unite the opposite sections. (See drawings.)

The weight of the parts required to make this alteration is estimated at forty-seven

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hundred (4,700) pounds, and the cost of making the alteration of a low 15″ carriage on this plan to one of increased height is estimated to be $612.

It is observed that the Department estimates the cost of the present high carriage and chassis at $2,600, without pneumatic buffers. Deducting the estimated cost, $900, (approximative,) of the new upper carriage, we have, say, $1,700 as the cost of the standard chassis. Hence, it will be seen that if the experimental carriage above described, or its equivalent, should prove satisfactory, the saving of an expenditure of $1,088 would be effected per chassis in the use of the appropriation of the present fiscal year, thus enabling us to produce with, say, $50,000, say twenty-five chassis of increased height, with pneumatic buffers, on this plan, instead of, say, seventeen chassis after the standard plan, with pneumatic buffers attached. If hydraulic buffers are used a greater saving would be effected.

The prospect of the inauguration of so great a public economy speaks for itself; and it hardly need be urged, in view of the satisfactory tests, as shown by the record accompanying this report, that a board, or other competent authority, should decide upon the question of the proper plan of attaining increased height for the 15″ carriages before another dollar of the public money is spent in this direction.

The question of the most economical, compact, and satisfactory means for absorbing recoil is also brought prominently forward by the experiments made with the hydraulic buffer, and contained in the accompanying record.

Owing to the more energetic recoil of our 15″ smooth-bores, using the maximum charge of powder, over the corresponding English 12″ systems of about the same weight of gun, it was determined to make the diameter of the cylinder 9″ instead of 8″, as adopted in the British service.

Another important change from the English system was also made by locating the cylinder at the front instead of the rear of the chassis, the piston thus, in the recoil of the upper carriage, being *pulled out*, and not *pushed in* as in the English model. Smoother working and less liability to breakage from irregular strains, better protection of parts under all conditions of service, and an equally if not stronger system generally throughout all its details, is believed to be secured by this change. The cross-head to receive and connect the piston-rod with the upper carriage is located, it will be seen, as in our present carriage, with pneumatic buffers. It is strongly braced by two wrought-iron (round) braces, extending from it to the front transom of the upper carriage. The cylinder is held in position and sustained by three cylinder transoms (double) connecting the cylinder with the chassis-rails, and taking the place of three original transoms in the chassis.

The cylinder, for economy, was made of old bronze.

The capacity of the cylinder is twenty-seven gallons. It is filled through a 1″ hole located on the top and 20″ from the rear end. The fluid is withdrawn through a ½″ hole located in the front head of the cylinder and at the bottom. It is closed with a screw-plug.

An examination of the record of the firing will show that with six holes ⅞″ in diameter in the piston, using nineteen and twenty-five gallons of water, sufficient resistance to check the recoil short of the counter-hurters was not developed. Three holes were accordingly used during the remainder of the experiments, the other three being closed by suitable plugs. After this change the record shows results of remarkable uniformity in lengths of recoil—satisfactory and less in extent, in the average, with pneumatic buffers—and under all angles of fire, and using maximum charges of powder and solid shot; also, the record shows no rupture of parts, and that, after thirty rounds of maximum service-charges, the carriage and its buffer had sustained no injury whatever, and that both remained in a fully serviceable condition.

Such satisfactory results, it seems to me, should lead to further investigation and test of this important question of absorbing recoil.

From a comparison of the force of recoil of a 12″ rifle with the recoil of a 15″ smooth-bore of about the same weight, it is probable that a 10″ diameter of cylinder, using four holes instead of three, would tend to ease the system more in firing maximum charges than the present arrangement, and give equally as good results. Other details may be judiciously changed, either as a matter of economy or to give increased efficiency to the system herein presented (as far as it has been developed) for the consideration of the Department.

As a matter of cost, the hydraulic buffer, from the estimates of this office, could be manufactured and attached for the sum of, say, $1,000, using a wrought-iron cylinder. If cast iron will answer the purpose, a reduction of price can of course be made.

The present pneumatic buffers cost, from the estimates before me, $1,400, attached. Hence, using the hydraulic check and the chassis proposed herein, a high chassis complete can be produced at an outlay of $1,612.

One hundred chassis are on hand in New York Harbor. Their alteration would cost $161,200. New chassis with pneumatic buffers would cost, say, $310,000.

If it should be determined to experiment further with this device, it is apparent that

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the subject of the necessity of the procurement of a non-freezing liquid is of the first importance.

Mixtures of glycerine and water, methyl and water, or the use of some of the non-freezing oils are relied upon to solve this problem.

In concluding this report, I may call attention to the fact that serious defects still exist in our present system of carriage construction for heavy guns, such as the use of eccentric axles for chassis, and in our arrangements for elevation, &c., and that these demand investigation and correction before we can produce a system literally fulfilling the perfections of a non-depressing carriage increased in height, as set forth in the resolutions of the board on depressing and other gun-carriage systems, convened under the orders from the War Department of December 23, 1872.

I here quote from the proceedings of the board:

"That the non-depressing carriage increased in height, and modified by the improved methods for working, with the addition of two air-cylinders for the purpose of absorbing the recoil, and also affording additional protection under the parapet to the men who serve the gun, recommends itself to the board as the very best service-carriage for any locality and under any probable circumstances, until a depressing carriage, whether by counterpoise, compressed air, steam, or any other method, be decided upon as the standard for service, combining the advantages of economy, strength, simplicity in structure and handling, which characterize the improved non-depressing carriage."

There remains but one more point in this connection to call the attention of the Bureau to, and that is that it would be well to further consider the subject of the retention of the old upper carriages.

The new top carriage is evidently superior in strength to the old one; but from our experience here with over two hundred rounds with the latter we have developed no serious defects.

It is presumed that we are now in a transition stage between the depressing and non-depressing systems; and the fact that the present carriage will subserve its purposes for any emergencies which might possibly intervene renders the question of utilization of our present material to its fullest extent, as a matter of economy, in this presumed transition stage one of the first importance.

Very respectfully, your obedient servant,

S. CRISPIN,
Brevet Colonel, U. S. A., Major of Ordnance.

Brig. Gen. S. V. BENÉT,
Chief of Ordnance, U. S. A., Washington, D. C.

I.

OFFICE OF U. S. ORDNANCE AGENCY AND NEW YORK ARSENAL,
New York City, July 3, 1874.

SIR: I have the honor to make the following report of the principal work done in moving, dismounting, and mounting 15″ guns and 13″ mortars and carriages for alterations, repairs, and preservation of the same, at Forts Hamilton and Wadsworth, New York Harbor, since November 22, 1873, to wit:

At Fort Hamilton.

Nine 15″ carriages were removed from the fort to the wharf for shipment to Fort Monroe Arsenal, for the purpose of attaching air-cylinders and cranes. From three of these carriages guns were dismounted.

Three 15″ carriages received from Fort Monroe Arsenal, having air-cylinders and cranes attached, were moved from the wharf to the fort, put together, placed in position, and the guns mounted and put in working order.

Twenty-one other carriages for 15″ guns have been altered by putting in improved thick pintle transoms, key-ways cut, and keys inserted in bolster. Cranes have also been attached to these carriages, all of which are now in working order.

A friction recoil-check (experimental) was put on one of the carriages and tested with a full charge.

All the 15″ guns and carriages at this post were, more or less, repaired by putting on new guides, sights, new bolts, &c.; they were also cleaned, painted, and lackered. The old pintle transoms and cranes were moved to the wharf and shipped to New York Arsenal, together with about three tons of old wheels and sockets.

Four 13″ mortars were moved from wharf to the fort, and are now ready for placing in position.

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At Fort Wadsworth.

Five 15″ gun-carriages were moved from the fort to the wharf for shipment to Fort Monroe Arsenal for the purpose of attaching air-cylinders and cranes. From two of these carriages guns were dismounted.

Six 15″ gun-carriages received from Fort Monroe Arsenal, having the air-cylinders and cranes attached, were moved from the wharf, placed in position, and the guns mounted. To accomplish this, four of the guns had to be moved about one-half mile each. One of these 15″ gun-carriages was placed in position on the beach, and the gun mounted for testing powders and velocities. All of these carriages are now in working order.

A 15″ carriage has been altered by increasing it in height 15″, by adding sections between the bolsters, props, forks, and chassis. A hydraulic buffer was also attached to this carriage, and the carriage and buffer tested with full charges.

The greater part of the work at these forts was done during the winter season under great disadvantage. Cradles, pulleys, rollers, rope, timber, plank, hydraulic jacks, and other materials were purchased, and mostly used up in its prosecution.

Very respectfully, your obedient servant,

A. G. SINCLAIR,
Superintendent.

Col. S. CRISPIN, *U. S. A., Commanding.*

II.

OFFICE OF U. S. ORDNANCE-AGENCY AND NEW YORK ARSENAL,
New York City, February 24, 1874.

SIR: I have the honor to inclose herewith drawings of a recoil-check, designed by Superintendent A. G. Sinclair, under the supervision of this office, and applied to and experimented with last January on a 15″ gun-carriage at Fort Hamilton, New York Harbor. A copy of the report of the experiments, made under the supervision of Lieut. John G. Butler, is inclosed.

The design now under consideration is the result of the instructions of the Department, dated November 28, 1873, in reply to my report on Fort Wadsworth of the same month, warranting the devising of some simple and efficient check to provide a readily attainable substitute for our present standard pneumatic buffers in cases of their absence and pressing needs arising for a temporary expedient for checking recoil.

The inclosed drawings give the details of the recoil-check; also show its position and application to the 15″ gun-carriage. The simple friction of two small plates, acting in contact with the upper and lower surfaces of a single broad wrought-iron rail, extending midway between the chassis-rails nearly the length of the carriage, combined with the increased resistance afforded by a slight wedge-shape given to the latter, afford the power for absorbing the recoil.

This apparatus is secured, it will be seen, to the front of the chassis by a transom, taking the place and position of the front hurters, and a plate bolted to it on top, between which the friction-rail passes, and is free to move to the front longitudinally. Its position with respect to the other parts of the carriage and chassis is clearly shown by the drawings. It is secured at the rear end by a rod attached to a rubber or steel spring. When the recoil of the upper carriage ceases, the strain on the friction-rail is at at end; but the elasticity of the rail reacts, and if it was rigidly attached at either end a tendency to buckle would evidently exist and destroy it as a recoil-check. This was a serious imperfection in the smooth multirail compressor. It will be seen that this defect does not exist in the present arrangement. The front end of the rail is free to move to the front, both because it is not rigidly fastened to the front hurter-transom of the chassis and has a flexible attachment at the other or rear end afforded by the rubber or steel spring.

In firing 15″ guns on wooden platforms, the distance obtained in the act of firing between the head *a a* and the hurter-transom was sometimes from ½″ to 4″, but in stone platforms the distance was reduced to say about ¼″.

These facts show the importance of the flexible attachment—either a rubber or steel spring. They were noticed in the firings for the engineers of say from thirty to fifty rounds with 15″ guns, full charges, in their experiments in wooden platforms in 1872 and 1873, the flexible attachment having been applied to Smoot's compressor, which had heretofore failed for the want of this yielding medium.

The box-clamp, with its friction plates and screw, is shown by the drawings; also, it is shown in position (with all its parts assembled) when the gun is ready for firing. The probable cost is about $200. No alterations are required in its application to the present system of carriages. It is evident that it can be readily placed so that the friction-rail will be either flush with or below the upper edges of the chassis-rails, (if so desired.) A different arrangement of the front transom of the upper carriage will simply be required.

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The experiments, it will be seen, were few, and all the contingencies of service have not attained in our test. They, however, are, as far as made, completely satisfactory, and it is believed that as a simple expedient for checking recoil the device under consideration will give excellent results, with judicious management, in all ordinary and supposable contingencies of service.

It is the intention, when experiments with it can be economically combined with others, to pursue the investigations into its merits further, and develop it, if it is, as is now believed, fully susceptible, into a practical system for checking recoils.

It is believed, it may be stated in this connection, that by permanently attaching the box-clamp to the upper carriage and employing a simple automatic device to turn the screw through a given arc, and acting at the time when the upper carriage is almost into battery, that a decided improvement will result. Especially will this provide for any neglect of gunners to tighten the clamp prior to firing, and thus avoid the possibility of the check ever being in a condition not to act when the gun is fired. Its undoubted economy, simplicity, and present apparent serviceability evidently warrant its not being lost sight of in the trials and tests which must necessarily follow in the future with pneumatic and hydraulic buffers in our efforts to secure a safe, simple, durable, efficient, and economical recoil-check.

Very respectfully, your obedient servant,

S. CRISPIN,
Brt. Col. U. S. A., Major of Ordnance, Commanding.

The CHIEF OF ORDNANCE, U. S. A.,
Washington, D. C.

[Inclosure.]

OFFICE OF U. S. ORDNANCE AGENCY AND NEW YORK ARSENAL,
New York City, January 24, 1874.

SIR: Agreeably to your instructions of the 20th instant, I have the honor to report that I have tested the experimental compressor attached to 15″ gun-carriage at Fort Hamilton by firing five rounds from the gun mounted thereon, as follows:

No. of fire.	Powder.		Projectile.		Pressure.	Elevation.	Men at compressor.	Recoil.		Remarks.
	Kind.	Weight.	Kind.	Weight.						
						°		*Feet.*	*In.*	
1	Dupont, 1864.	70	Shot ..	450	16.000	1	1	7	1	Carriage worked well.
2	Mammoth...	80	..do ..	450	24.000	1	2	6	10½	Do.
3	...do	90	..do ...	450	28.000	1	2	5	8½	Do.
4	....do	100	..do ...	450	31.000	1	2	5	10½	Do.
5	...do	100	..do ...	450	33.000	1	2	4	9½	Do.

As a means of checking recoil this appliance answered the purpose perfectly throughout the above limited trial; and as the compressor screw was set tightly enough to bring the carriage to a rest after a very short recoil, without the slightest apparent injury to carriage or compressor, it is probable that the above five rounds constituted a severer test of the strength and efficiency of the system than a much greater number of rounds with a looser setting of the compressor.

I have only to suggest that, to increase the convenience and efficiency of this apparatus, the compressor screw should be permanently attached to the front transom of the top carriage; the compressor plates provided with flanges or gibs as guides, and the friction-strap bolted or keyed to the cross-head, which at present confines it in one direction only by a flange.

The friction-strap, moreover, should be two or three inches longer, so that in case of extreme recoil the carriage shall reach the counter-hurters before the clamps reach the end of the plate.

If the compressor screws were of steel instead of wrought iron there would, doubtless, as Mr. Sinclair suggests, be less tendency to upset, and hence work stiffly; nor can there be any objection to increasing the depth of the screw-box or female screw as an additional precaution in this direction.

It is not known that it is necessary to carry out these latter suggestions; they are precautionary simply, in view of a contingent adoption of the system.

Very respectfully, your obedient servant,

JOHN G. BUTLER,
Lieutenant of Ordnance.

Col. S. CRISPIN, U. S. A.,
Commanding.

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III.—*Record of firing with 15″ Rodman gun No. 132, (O. A. & Co.,) at Fort Wadsworth, New York Harbor, for the purpose of testing an altered 15″-gun carriage increased in height 15″, and supplied with a hydraulic cylinder for checking recoil, as planned in detail at the New York ordnance agency, the work being executed under its supervision.*

No. of fire.	Time.		Powder.			Projectiles.			Elevation in degrees.	Pressure per square inch of bore.	Quantity of water in cylinder.	Recoil.	Special remarks about each fire.
	Month.	Day.	Kind.	Weight.		Kind.	Weight.						
	1874.			*Lbs.*	*Oz.*		*Lbs.*	*Oz.*		*Lbs.*	*Gallons.*	*Feet.*	
1	June.	12	Dupont mammoth	70	....	Shot	450	....	10	24,000	19	Full.	Carriage recoiled violently against hurters, bending pintle transoms and stretching hurter-bolts.
2	..do ...	12	....do	70	....	....do	450	....	10	21,000	25	Full.	Carriage recoiled violently against hurters; rubber packing forced out of cylinder-head.
3	..do ...	13	....do	60	....	....do	450	....	1	.....	25	4′ 10″	
4	..do ...	13	....do	70	....	....do	450	....	1	.....	25	4 1	
5	..do ...	13	....do	90	....	....do	450	....	1	.....	25	6 1¾	
6	..do ...	13	....do	100	....	....do	450	....	5	.....	26	5 4	
7	..do ...	13	....do	100	....	....do	450	....	1	.....	26½	5 4	
8	..do ...	17	....do	100	....	....do	450	....	1	25,000	26½	5 8	
9	..do ...	17	....do	100	....	....do	450	....	1	.....	26½	5 9	
10	..do ...	17	....do	100	....	....do	450	....	1	.....	26½	5 8	
11	..do ...	17	....do	100	....	....do	450	....	1	.....	26¼	5 8	
12	..do ...	17	....do	100	....	....do	450	....	1	.....	26	5 11	
13	..do ...	17	....do	100	....	....do	450	....	5	31,000	25¾	5 11	
14	..do ...	17	....do	100	....	....do	450	....	5	.....	25¾	5 11	
15	..do ...	17	....do	100	....	....do	450	....	5	.....	25½	5 11	
16	..do ...	17	....do	100	....	....do	450	....	5	.....	25¼	6 1	
17	..do ...	17	....do	100	....	....do	450	....	5	25,000	25	6 0	
18	..do ...	17	....do	100	....	....do	450	....	10	.....	24¾	6 2	Carriage worked well.
19	..do ...	17	....do	100	....	....do	450	....	10	.....	24¼	5 11	
20	..do ...	17	....do	100	....	....do	450	....	10	30,000	24½	5 11	
21	..do ...	17	....do	100	....	....do	450	....	10	.....	24¼	6 1	
22	..do ...	17	....do	100	....	....do	450	....	10	.....	24¼	5 11	
23	..do ...	17	....do	100	....	....do	450	....	15	31,000	24	6 0	
24	..do ...	17	....do	100	....	....do	450	....	15	.....	24	5 10	
25	..do ...	17	....do	100	....	....do	450	....	15	.....	24	6 1	
26	..do ...	17	....do	100	....	....do	450	....	15	.....	24	5 10	
27	..do ...	17	....do	100	....	....do	450	....	15	.....	24	5 11	
28	..do ...	17	....do	100	....	....do	450	....	20	.....	24	6 0	
29	..do ...	17	....do	100	....	....do	450	....	20	.....	23¾	5 10	
30	..do ...	17	....do	100	....	....do	450	....	20	40,000	23⅞	6 1	
31	..do ...	17	....do	100	....	....do	450	....	20	35,000	23½	5 10	
32	..do ...	17	....do	100	....	....do	450	....	20	.....	23⅝	5 11	

GENERAL REMARKS.

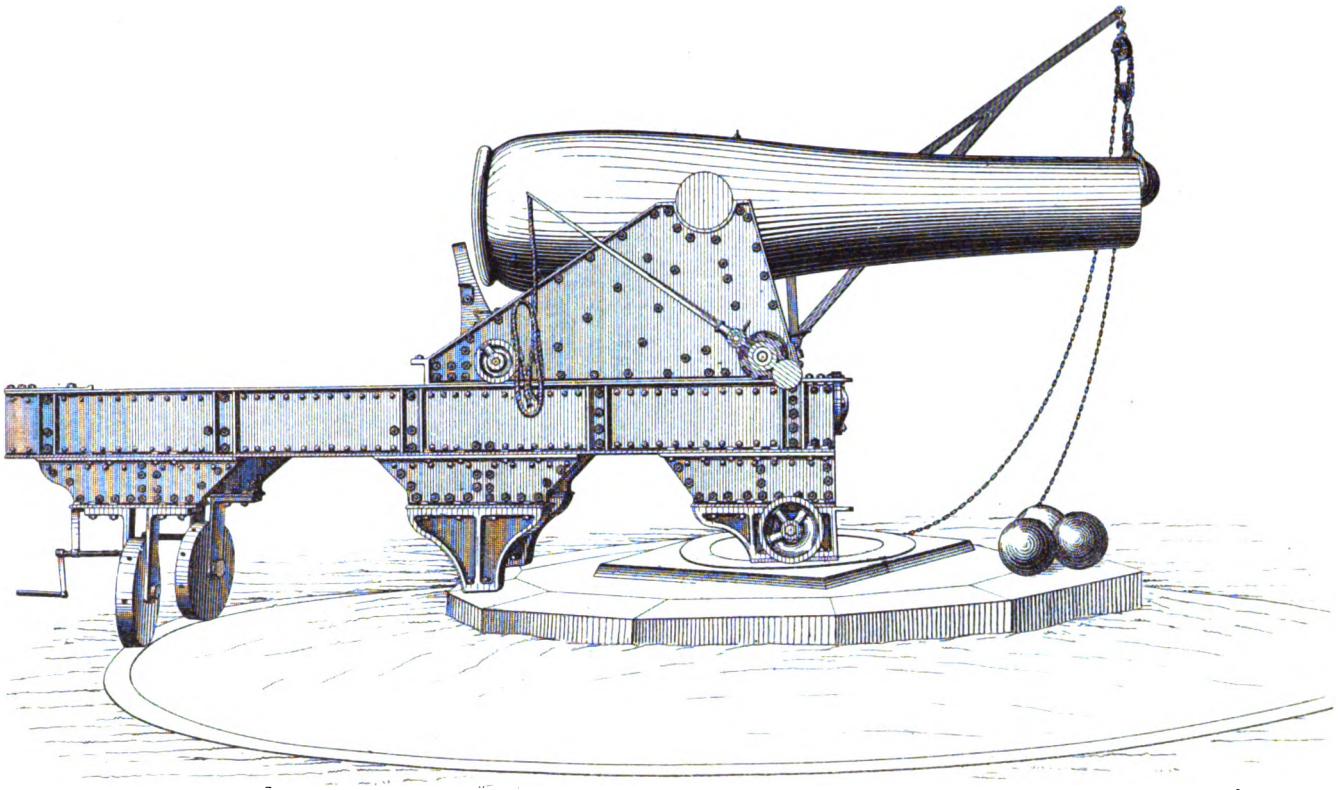
The piston having six perforations 0.9″ in diameter each, the recoil was violent, as shown by the first two of the above rounds. Three of the perforations were then closed securely, and the rubber-packing omitted from the cylinder-head. After these changes the system worked admirably. (See record of firing of June 17, 1874.)

Pressures were only taken at the first, second, eighth, thirteenth, seventeenth, twentieth, twenty-third, thirtieth, and thirty-first fires.

It will be seen that the quantity of water was slightly varied throughout the firing. This variation is not necessary to obtain satisfactory results.

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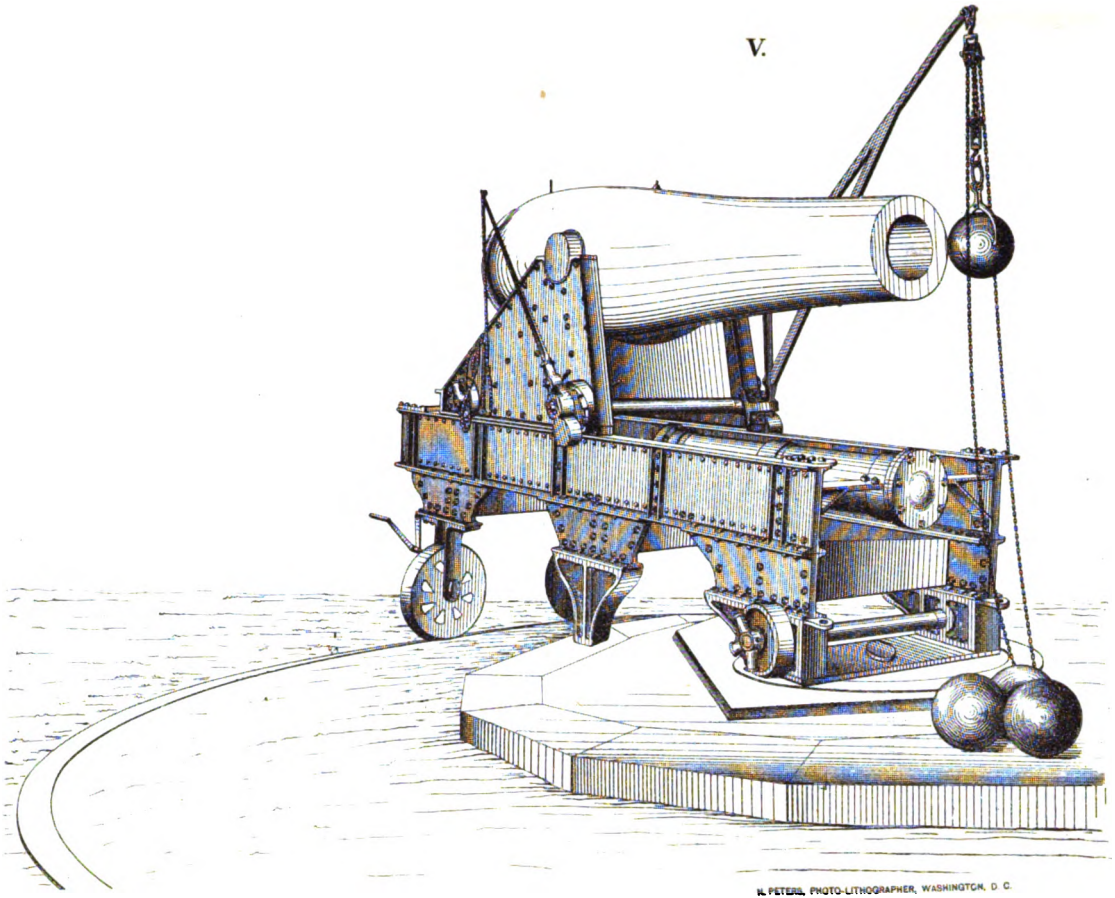


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V.



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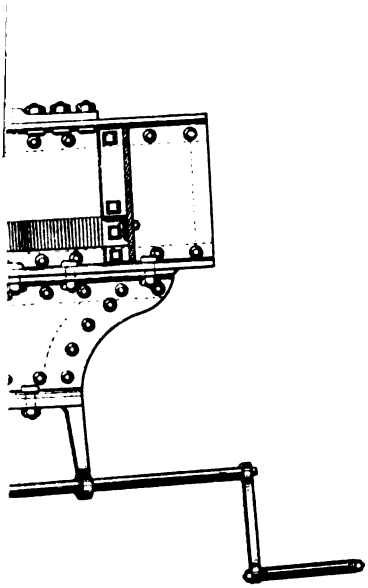
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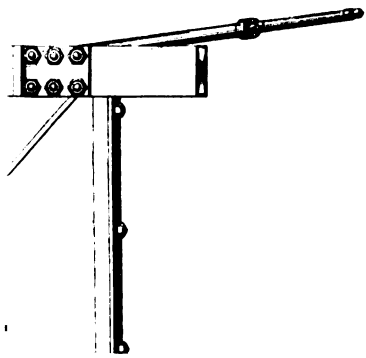
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RAULIC BUFFER

Inches.

RK JULY 1874.





R. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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APPENDIX I.

UNITED STATES ARSENAL,
Benicia, California, July 19, 1873.

SIR: I have the honor to submit the following as a report in reference to the work done in boring the artesian well at this post during the past year:

In the year 1862 a practical well-borer made a survey of the Government reservation at this place, and offered to obtain artesian water for the sum of $40,000. He had just completed a well at Stockton to supply that city with water, and had bored to a depth of 1,200 feet. Before that date the Pacific Mail-Steamship Company had bored a well at their works, in Benicia, to a depth of nearly 350 feet without obtaining water.

The strata which underlies the whole neighborhood are adobe clay, disintegrated rock, yellow sandstone, and bluestone; the Pacific Mail-Steamship Company did not bore through this last. It is believed by the old residents of the vicinity that if this stratum of blue rock was pierced artesian water could be obtained.

The cañon in the rear of the arsenal store-house was selected as nearly the lowest spot on the reserve in which to commence boring, and the assistance of Mr. Wiggins, who had been sinking wells on the other side of the bay, was obtained.

It was determined that the first pipe should have a diameter of 11 inches, as it might be necessary to bore to a great depth and use pipes of smaller diameter below. The tools and pipe had to be manufactured, the latter being made of No. 12 iron, in sections, each one two feet in length; it was double, outer and inner sections breaking joints with each other. The above work occupied some time, and boring was not commenced until the 1st day of September. The auger was only used for a few days, as the rock was found within 20 feet of the surface of the ground, and a drill had to be substituted for it with a spring-pole as the power with which to work it.

In the month of October a frame 33 feet high was erected and inclosed, and an engine-house was built adjoining it. From the time of receiving the appropriation information in reference to well-boring was sought for in most of the books published on the subject. The master machinist at this arsenal, Mr. E. Bandel, found an account in a German newspaper of a new method of boring artesian wells which had been invented by Mr. Kline, of Germany, and the same paper contained an advertisement of a book explaining his process. The book was obtained from Europe and the principal parts were translated. The first expenditure for machinery and tools seemed very large, but the work reported as accomplished was so complete in its character that the new system was adopted as most likely to prove successful. Mr. Kline worked with a lever and employed two gangs of men, eight persons in each gang. In this country the work done in this manner would cost $32 a day. This expense, it was ascertained, could be avoided by using a vertical steam-cylinder and piston with an automatic working valve to move the lever, at a cost of $150. Some other improvements were made at this arsenal in the tools and machinery described, and their manufacture was commenced. In this month while putting down the pipe the steel ring with which the bottom of it was armed broke, and the pipe was forced in as it was pressed down by a bowlder in the side of the well-hole. This obstruction did not project far enough for our tools, but just sufficiently to effect this mischief.

The whole pipe, 77 feet, had to be taken out of the well in the month of November, repaired, and a new steel ring adjusted. This caused several caves in the sides, and before replacing the pipe an auger had to be used to loosen the *débris*, which had become hard and filled up the bottom of the well. The gain, therefore, in this month, was only 12 feet. In the month of December the well was deepened 47 feet, making its total depth 136 feet. The strata had become firmer, and it was deemed advisable to try an experiment and see if the wall of the hole was self-supporting; therefore, only 14 feet of pipe was used, which left a distance of 45 feet at the bottom of the well without any pipe. This anticipation was not realized, for in the month of January two large caves occurred, produced by the action of the water in the well on the soluble portions of the strata. The hole was reamed out to receive the pipe, and the *débris* collected in the bottom had to be removed in the same manner and by the same tools as in the month of November. The pipe was inserted to a sufficient depth by the end of the month to cover the cave-holes, but much time was occupied in removing parts of broken tools and bolts from the bottom of the well.

In the month of February the remainder of the well was reamed out, the depth of it increased to 150 feet, and the pipe was sunk to within 8 feet of the bottom.

An accident occurred similar to the one previously experienced; the steel ring of the pipe was broken by a bowlder in the side of the well, and an unsuccessful attempt was made with two hydraulic pumps to raise the pipe. The parts of the ring, however, after great labor and patience, were extricated, leaving the bottom of the pipe jagged and broken. It was now found necessary to ream out the hole much more carefully on every occasion before lowering the pipe. This extra care did not solve the difficulty, as the rough ends always turned up, filling the pipe as it was forced down so that the tools could not be used. Therefore, it was found necessary, whenever the

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pipe had been lowered that a 10-inch shell, re-enforced to make it 11 inches in diameter, with a conical iron cap on top of it, had to be forced through the pipe to press out the ends and smooth the sides. This arrangement was proposed by Lieutenant Clifford, and proved a success, but its use consumed a great deal of time.

Before the 1st day of March the frame for the lever had been erected and the latter substituted for the spring-pole; the steam-cylinder to move lever and a patent drum for hoisting and lowering tools had been placed in position. The old steam-engine had been repaired to drive main shaft from which the drum was worked by a counter-shaft, the boiler at the same time supplying steam for the cylinder.

The following is the description of the free falling apparatus and drill as they were manufactured at this arsenal. They consist of two cheeks, a tongue, a pair of jaws, a drill-rod, a wooden guide, and a drill, all the parts being of iron or steel except the guide.

The two cheeks are assembled at top by four iron screws holding the upper rod on which a sliding system works, and at bottom by a steel wedge between two keys, the three passing through a slot in lower part of tongue. The cheeks are each 6 inches wide and one half of an inch thick; between them the jaws and tongue work. The latter has a socket at its lower extremity into which the drill-rod is screwed. The jaws are fastened to the sides of the cheeks by two bolts which act as journals and are worked by a slide. This slide has a disk of leather nearly the same diameter of the pipe fastened to the top of it. The action of the water in the pipe on top of this disk as the rods are raised presses it down, and thus shuts the jaws on the tongue and the drill is raised.

On reaching the height of the stroke the rods are lowered, and the disk, pressed down against the water in the pipe, works up and opens the jaws so as to free the tongue, drill, &c., which fall to the bottom of the well. The drill-rod is made of 2½-inch iron; the drill is armed with two side-edges which are perpendicular to the edge of the drill itself. Above, on the drill, are two side-cutters pressed out by a spiral spring, the edges of which are also perpendicular to the drill; wooden plugs are inserted behind them to reduce the distance between their outer faces to the diameter of the drill, so that the latter can be lowered into the pipe. These plugs are jarred out when the drill projects below the pipe in the well, and the spring forces the cutters out so that they enlarge the hole made by the drill, and the pipe can be readily pressed down. The drill-rod works loose in the wooden guide, which serves to keep the drill in the center of the well-hole. This arrangement allows lighter material to be used for the rods than if they were required to sustain the jar of the drill as it strikes on the rocky bottom of the well. The breaking of the couplings or the stripping of the male and female screws which compose them are both prevented.

The weight to be raised from the well is much smaller, and a gain is made in the power saved. One of the greatest sources of danger and detention heretofore experienced in boring wells has been the breaking of rods and couplings; the liability of such accidents is diminished by the use of this invention. The advantage gained in weight and cost of material by using it can be realized by comparing the cross-section of the rods above the free falling apparatus, *i. e.*, one square inch, with the cross-section of the drill-rod used below it, which is 4.9 square inches. Another gain in time is, that under the old system two operations were necessary, first the drilling of the hole, and then it had to be reamed out to a sufficient diameter to admit the pipe,; both of these are now accomplished at the same time by the drill and side-cutters. Another difficulty mastered was that formerly in using the reamer one side of the well, if of softer rock, would be cut away more than the other, and the pipe might be forced into a crooked hole; while at present, in this apparatus, the drill serves as a center to regulate the action of the side-cutters.

The ordinary length of stroke has been 20 inches, and the falling weight 500 pounds; therefore the quantity of action at each stroke, deducting one-seventh for water displaced, is equal to 715 foot-pounds, and for one minute is equal to 17,875 foot-pounds, as the average number of strokes per minute is twenty-five.

When everything was ready, both tools and machinery, the well-borer was discharged, and the master machinist, who had manufactured the new tools, was placed in charge of the work.

A bowlder of iron pyrites was struck in the bottom of the well and broke the drill; the pieces were extracted, and the obstruction was pierced with a new drill by diminishing the length and time of the stroke. This is easily accomplished by moving the fulcrum of the lever to the front and running the engine at a lower speed. In this month, although much time was occupied in effecting the change of machinery and tools, and getting all to work smoothly, the well was bored to a total depth of 197 feet, and the pipe was pushed to within 6 feet of the bottom without the use of a reamer.

This success, on account of the jagged condition of the end of the pipe, was considered an excellent proof of the value of the new tools.

In the month of April the well was bored 5 feet, making a total depth of 202 feet.

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It was then resolved to substitute a pipe of 9 inches in diameter for the present one. These were the reasons which led to this determination: first, the cost of boring so large a hole increases greatly as it is deepened; second, the liability of the ends of the pipe, in their broken condition, doubling up so that they could not be pressed out, and a difficulty of this nature is always augmented when we increase the distance of the bottom of the pipe from the surface of the ground; and last, the loss of time which was experienced in the constant use of the shell. The new pipe was made of No. 16 iron, doubled and in sections of 2 feet, breaking joints as in the old one. The method of putting this pipe together was modified, however; instead of building it joint by joint as it was lowered, lengths of 10 feet were made and riveted together as the pipe was sunk, with tools manufactured expressly for the purpose. Machine-screws were used in connecting these lengths, and common counter-sunk rivets for the sections, time being gained by this operation.

An additional drum was erected, to be run by steam-power, with 500 feet of one-half inch iron-wire rope, tarred, for lowering and hoisting pump; thus one hour was saved each time the well was cleaned. All this 9-inch pipe was made and coated inside and out with coal-tar, and put in well this month.

In the month of May the hole was deepened 60 feet 10 inches, and in June 55 feet 4 inches, making a total depth of 318 feet 4 inches in the year.

Below is a copy of one of the weekly reports furnished the commanding officer.

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Journal of artesian-well boring at Benicia Arsenal, Cal., during the week ending June 21, 1873.

Date.	Number of hours of work.	Number of men.	Description of strata.	Daily performance.																		Remarks.
				Drilling.				Piped.							Ordinary.						Extraordinary by breakage of other parts.	
				Daily.		Total.		Daily.	Total.						Inserting rods and extracting.		Cleaning out well and otherwise.		Total.			
				Feet.	Inches.	Feet.	Inches.	Feet.	Feet.	Time of laboring and piping.		With a stroke of.	Falling-weight.	Total number of rokes, estimated.	Number of times cleaning well.							
										Hrs	*Min*	*Ins.*	*Lbs.*			*Hrs*	*Min*	*Hrs*	*Min*	*Hrs*	*Min*	*Hrs*	*Min*	
June 16	9½	6	Shale	2	8	292	10	.....	282	6	30	20	500	9,750	4	2	10	....	50	3	....	....	....	Time lost by allowing side-cutters to wear down too much.
17	9½	6	Shale, softer	2	9	293	7	10	292	5	10	20	500	7,750	4	2	10	2	10	4	20	....	....	XXII section of pipe.
18	9½	6	do	3	.....	298	7	.....	.....	6	15	20	500	9,375	4	2	10	1	05	3	15	....	....	
19	9½	6	Silicious rock	2	8	301	3	.....	.....	5	25	20	500	8,125	4	2	10	1	55	4	05	....	....	Sent drill to shop to be dressed. Struck a hard bowlder in forenoon.
20	9½	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	30	No boring done, the pipe on lowering being found to lodge. The well below pipe was enlarged.
21	8	6	Shale	.....	.....	.....	.....	10	302	.....	.....	.....	.....	.....	2	1	10	....	40	1	50	6	10	No boring done; the enlargement was continued and finished. XXIII section of pipe. One of the side-cutters broken in enlarging well.
Total	55½	.....	.....	11	1	301	3	20	302	23	20	....	.....	35,000	18	9	50	6	40	16	30	15	40	
Average	9¼	6	.....	1	10.16	.....	...	3.33	.....	3	54	20	500	5,833	3	1	38	1	06	2	45	3	36	

I certify that the above statement is correct.

EUGENE BANDEL.

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A mistake occurred in this last month which caused an accident. The side-cutters became too much worn and did not cut the bore large enough for the pipe. This was not discovered until the workmen pressed the pipe down, when they found a shoulder on which it rested. The well had to be reamed out with new side-cutters, and as the whole weight of the drill-rod was received by them, the drill not reaching to the bottom, they were broken several times before the reaming out was accomplished.

On examination of the foregoing report it will appear that the drilling and piping occupied six and one-half hours; the remainder of the time, three and a half hours, was expended in lowering and hoisting the tools and cleaning out the well. As the hole is deepened the time thus occupied will increase and our daily progress proportionally decrease.

The strata perforated have been adobe, clay, shale, sandstone, silicate of alumina, free silica, and cement-rock. Bowlders of iron and copper pyrites and blue rock have been encountered and caused great trouble; much labor being required in their removal, and in some instances the progress made being not more than one inch per hour.

The well has now reached the cretaceous subdivision of the Mesozoic time. Patience, care and time are required for the successful prosecution of this work; the motto "festina lente" must be faithfully observed, for the act of a moment might involve a month's delay in having to extricate tools broken in the well.

The present appropriation will be sufficient to carry on the work 600 feet farther this year, making a total depth of 918 feet; but, as the boring should be continued until artesian water is obtained or granite is reached, it has been deemed expedient to ask for another appropriation for the next year.

The Stockton well furnishes excellent water from a depth of 1,200 feet, and no one, except a resident of this dry climate, can appreciate the substantial benefit to be obtained from the possession of such a well.

I am, sir, very respectfully, your obedient servant,

J. McALLISTER,
Major Ordnance, Commanding.

The CHIEF OF ORDNANCE,
Washington, D. C.

BENICIA ARSENAL, CAL., *July* 29, 1874.

GENERAL: The following account of the progress made in boring the artesian well at this post during the past fiscal year is respectfully submitted. Reports have been furnished to you regularly, but they have been necessarily limited, and only stated the actual work accomplished each month. The combination of these would not be a history of the progress of the well, and would differ as much from it as the result of a campaign from the narrative of its events.

Anticipations of rapid progress were entertained at the end of the last year, and were the natural deductions from the results of the boring performed in the preceding months of May and June. These, however, have not been realized. In those months, embracing fifty-two working-days, the well was sunk 116 feet and 2 inches, giving a daily average of 2.234 feet. The only detentions to our work experienced during that year were the selection of the best system for boring, and the manufacture of the necessary tools, but this year many obstacles have been encountered which perseverance and patience have conquered.

The first month was prosperous in results; the well was sunk 63 feet and 7 inches in twenty-four working-days, this giving an average of 2.65 feet per day. No accidents or breaking of tools happened; the drill pierced the shale readily, and the loose nature of the soil was proved by the escape of gas which passed up through the water from the bottom of the well in so great a quantity that when the pump was raised with the *debris*, a lighted paper thrown into the pipe ignited the gas, which burned for five seconds, and which proved to be carburetted hydrogen.

Six days during the month of August were occupied in performing the following necessary work: The foundations of well-tower were secured, a flat steel-wire rope 80 feet long was substituted for the hemp one hitherto used to hoist the rods out of the well, and the drum was altered to fit it. A rack was made and fastened in top of tower so that sections of rods 30 feet long might be suspended, thus obviating the necessity of uncoupling every section in raising and lowering drill. Eight hundred feet of new one-half-inch iron-wire rope was spliced to rope of the same kind already in drum which was used for hoisting and lowering pump. The average daily progress was 2.75 feet for the twenty days occupied in boring; this was better than that made in July.

On the 26th of this month the well commenced caving below the pipe. One section of pipe was immediately attached, and the pipe pressed down, but this failed to effect

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the desired object. A second section was then riveted on and the pipe forced through the *débris*. This stopped the caving, but the earth on the outside began binding the pipe, and it was feared that it would be necessary to raise the whole pipe to allow the earth from the cave to fall into the bottom of the well from whence it could be removed by the pump. This accident filled our minds with apprehensions for the future, as the extent of the cave could not be well determined, and the broken stone and clay might finally settle around the pipe and act as a vise to prevent its being hoisted or lowered.

In the month of September the maximum depth drilled in any one day was 3 feet, and the minimum result obtained in the same time was 1.166 feet, a decided difference, accounted for by the hardness of the rock encountered by the drill; the specimens obtained during the last day referred to, readily cut glass. On the fourth of this month, in forcing the pipe down, the lever usually employed was broken, and the pipe could not be moved with the means at hand. On the sixth the pipe was raised 30 feet, the well-hole cleaned out with the pump, and then it was lowered rapidly, in order that its weight might be advantageously used to sink it. By this means it was pushed down to within 15 feet of the bottom of the well. Here it might be well to describe our method for raising the pipe.

At the bottom of the system of rods, instead of the drill, a tool with two prongs is screwed on, their ends being turned out and up, and a heavy wedge moved by a rope hangs just below it. The rods are sunk until the end of this tool projects below the bottom of the pipe, then the wedge is drawn up between the prongs by the rope, and their ends are thus forced out beyond the bottom of the pipe, so that when the rods are drawn up the ends catch under the steel ring of the pipe. In this case a screw is substituted for the upper joint of the rods on which a large iron nut works. The nut rests on an iron plate which covers the top of the pipe and through which the screw passes. This nut tightens the whole system of rods, and holds the sections of pipe firmly together, and by this means the rivets of the pipe are relieved from all strain. A wooden collar or clamp is fastened around the top of the pipe, and the force to raise it is applied to this as well as to the projecting end of the system of rods. When the pipe is raised a sufficient distance the nut is unscrewed and the rods pressed down, so as to disengage the points from the ring at the bottom of the pipe. The rope holding the wedge is loosened and its weight pulls it down, so that the prongs of the fork at the end of the tool spring together and the tool can be drawn up through the pipe.

On one occasion a cave occurred below the pipe and above the pump, which was at the bottom of the well, filling pump and bore of well completely. This was one of those accidents that could not be prevented, and, after using all the force that the wire rope (one-half inch in diameter) attached to the pump could stand, it was deemed expedient to break out the bottom of the pump, so that it might be extracted. To effect this the bottom of the rods was armed with a sharp-pointed steel tool, instead of the drill which was thrust down through the mud and pump, and we churned on until the valve and bottom of the pump were entirely destroyed. Even after this was accomplished, the attraction of cohesion of the mud to the cylinder or barrel of the pump was so great as to require the exertion of considerable power to start it afterward from its mud-bath. The pump had to be repaired, which caused a delay, as nothing could be done until the bottom of the well was cleaned from the *débris* of the cave. In lowering the pipe another difficulty was encountered; the very hard rock which had rendered the daily progress very slow, seemed to be on one side of the well-hole entirely, and we found that it had thrown the drill constantly to the other side, thus making the bore crooked, and the pipe could not be pressed downward. The drill and side-cutters were used carefully at first, to rectify this defect, but they did not answer our purpose. The pipe was then raised and the hole filled up to a depth of 13 feet with hard grit, and the boring was commenced with drill and side-cutters, as if we were working through the original rock. Finally the bore was enlarged, straightened, and the pipe pushed to the bottom of the well.

The strata which have been encountered are silicious shale, bluestone, and bowlders.

During the month of October twenty-five days were occupied in boring, and a depth of 57 feet obtained. The average was 2.28 feet per day. The minimum depth made in any one day was 1.83 feet, and the maximum 3.08 feet. The drill broke twice and had to be replaced with a new one. Great difficulty was experienced in pushing the pipe down; the soil from the caves had settled around the outside of it in different places and held it tight. It was found that the force necessary to overcome this resistance was directly proportional to the time that the pipe remained in one position, and orders were given to move the pipe each day, either up or down, so that the force exerted by the attraction of cohesion between the mud and outside surface of pipe might be broken every twenty-four hours. This operation required time which had to be deducted from that usually devoted to boring.

In November the trouble of piping increased daily until the pipe began to suffer from the force used on it; finally, on the 15th of this month, it came to a halt and could not be moved either way. A fifteen-ton hydraulic pump was used to its full

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power, and the pipe itself weighed 6,160 pounds, which must be considered in estimating the resistance offered to motion. If a greater force had been used to push the pipe down, it would have been bent or telescoped; and if any attempt had been made to raise it it would have been torn apart. The bore was piped to a depth of 557 feet, and entirely secured from accident as to that distance. This pipe, 9 inches in diameter, only projected 357 feet below the bottom of the 11-inch pipe first used, and the hope which was entertained of pushing this diameter of pipe to a depth of 500 feet or more below the first one proved fallacious.

A well-borer can realize the great disappointment which was experienced by all interested in this work when this conclusion was forced upon us. The necessity of diminishing the size of pipe at such a short distance from the surface was distressing, as it left us only two diameters to use, *i. e.*, 8 and 7 inches. The last named is the smallest pipe in which a free falling-apparatus can be used, and this is the only machinery by which we can reach a great depth with any certainty. The side-cutters were removed and we continued to drill a 9-inch hole through the silicious shale, using the drill alone, and expecting to attain a stratum in which we might dispense with the pipe entirely, hoping that the walls of the well would prove strong enough to sustain themselves. Two days after, at a depth of 565 feet, we struck a stream of subterranean water, which came up the pipe to the surface of the ground. It had a way of egress, however, as the pump brought up no mud, only the broken pieces of shale, all the stone-dust being carried off by it. The water which was brought up was sufficiently warm to smoke when emptied from the pump during the early hours of morning.

On the day after we met this stream, and on several successive mornings, a scum of brown powder 3 inches thick was found on the top of the water in the pipe, which had to be cleaned off before work could be commenced. This was analyzed and found to be the best kind of coal, containing a large amount of carbon, very little bituminous matter and little ash. The water must have passed through some coal-bed before our drill reached it, but we judged it was a very small stream; had it been of any size, the drill would have sunk suddenly when it first pierced the arch over it. The progress made this month in boring was 42 feet 10 inches; the average daily work for the time employed, 2.379 feet; the minimum in any one day was 2.0833 feet, and the maximum 2.833 feet.

In December the water receded, while the work was in progress during the day, some 3 feet, and rose each night. A lifting-pump was rigged to ascertain the amount of water that could be obtained from this source, but the water was readily lowered in the pipe beyond the power of the pump to raise it. The rod of the free falling-apparatus was increased in length to keep the leather disk in the pipe, so that it could play its part in opening the jaws of the instrument. This alteration only enabled us to reach a depth of 578 feet 3 inches, for the walls of the well commenced caving, and the pipe could not be pushed down to stop this stream of water, which was loosening all the disintegrated shale in the stratum in which we were boring.

On the 6th of December we stopped boring, and the following work had to be completed before we could resume our operations for an 8-inch well. The diameter of the tools had to be reduced, the distance between the outside of side-cutters, to 8 inches, and 600 feet of pipe, out of No. 16 iron, had to be fabricated. This pipe was made in lengths of 20 feet and covered with coal-tar, inside and out. One advantage gained by this delay was that this coating had time to harden before the pipe was wanted. The tool used on the inside of the pipe for riveting against, in joining sections, had to be reduced in diameter, and its handle had to be lengthened to conform to these 20-foot sections. This tool consists of two segments of a disk of iron 4 inches thick, the disk having the same diameter as the inside of the pipe. These segments are attached to the prongs of a fork which are forced out by a wedge. When the wedge is pulled up in its place, its edges fit the edges of these segments, so that the three form a disk or a circular plate 4 inches in thickness, filling up the pipe and furnishing a solid mandril to rivet against. The month of January and a portion of February was occupied in completing the arrangements and alterations mentioned in detail above, and with a *nil desperandum* we commenced a new era and a new year.

On the 18th of February the new pipe was lowered into the well. It was arrested on the 24th, 20 feet above the real bottom, by a mass of stones which had filled up the bore to that distance. We tried to remove this by using the pump, but without success. The pump would not sink into it, and, therefore, nothing could enter the valve. This *débris* was so compact that the drill without side-cutters had to be used to break it up before we could extract it. The progress for the five days worked this month was 14 feet 9 inches bored, and the well was piped to a depth of 589 feet.

On the 17th of March, at the depth of 615 feet, a bowlder or stratum of extremely hard rock was encountered, and, on raising the tools, they were found very much worn, and their edges broken. In four shifts of work the progress decreased from 15 inches to 4 inches a shift, and the rock on one side of the well defied the efforts of the tool. It was found that the drill had been working constantly over to the opposite side of the well, and the rods commenced to bend; this of course stopped the boring. The pipe

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was lowered, and the point at which the drill commenced to diverge from the axis of the well fully ascertained. It was then raised to give free working room below, and the experiment which had been tried before of filling up the well with hard grit and boring it over again was commenced. The rock was so very hard that it was difficult to obtain fragments harder and unless they were harder the drill would work into the old hole. One day 8 inches were made, and another 4 inches.

The above method of straightening the well-hole was tried many times and only partial results obtained. The bore was reamed out and straightened to within 15 inches of the real bottom, but a projection still existed on one side of the well which the tools could not remove. It was surmised for some time that the difficulty was due to the inclined direction of the strata and the constant glancing off of the drill as soon as it struck it, and not to the great hardness of the rock. This was a mistake, and it was made apparent when we filled the well with pieces of broken bowlder and could make no impression on this obstruction; the side-cutters refused to attack it, closing on their downward stroke, which they had never done before. The old tools failing us we had to make new ones.

April was consumed in making preparations for work and reaming out the bore. A new boring-bar, shorter and stronger than the old one, was made, with a guide, iron-lined to prevent abrasion, and a new drill. Work was commenced with a reduced stroke to dress out well to the true diameter. The well was filled up with spawls from broken bowlder to a depth of 8 feet at first, and boring commenced, every care being taken to watch the action of the tools, and to ascertain if they were glancing from their work. As soon as the tools showed signs of avoiding the rock below, the well was filled up again, and this had to be done on four different occasions before the bottom of the well was reached by the side-cutters. Even after this was accomplished, some rough spots were left on the sides of the well which had to be removed. The depth of the well was not increased this month.

The work in May was attended with a great deal of interest. In attempting to ream out the hole through the bowlder with side-cutters, the ends of both of them broke off, and three days were occupied in extracting the pieces of these tools from a depth of 621 feet. They were first broken into small pieces and then these were raised up with a new scraper having a large lip. The reports of progress were disheartening for days, six men and one steam-engine working eight hours and accomplishing but 2 inches or twenty-five hundredths of an inch per hour. The reports for fourteen consecutive days varied from 2 to 5 inches increased depth. On the 12th instant the side-cutters, which were either broken or ground down so as to be useless, were left off entirely, and it was determined to use the drill to ascertain, if the bowlder had a bottom, how far it would be necessary to proceed in order to pierce it and reach some softer rock. During this work the tool rebounded constantly from the rock, and the wear of the drill was so great that it had to be sharpened every time it was raised. The drill, after being battered in this manner for fifteen days, reached a softer subsoil, and the pump brought up fragments of shale. This bowlder measured 9 feet 7 inches through, and portions of it possessed sufficient hardness to cut glass. Now that the thickness of this "nether millstone" was known, preparations were immediately made to enlarge the bore of the well to receive the pipe. The best pair of side-cutters were selected and attached to the apparatus and the stroke reduced one-half. This latter precaution was necessary, as the side-cutters had really to bear the entire shock of the stroke. The work was prosecuted successfully during the few remaining days of the month, and at the end of it there was only a distance of 3 feet 6 inches to be enlarged. The difficulties overcome have demonstrated that the tools employed are capable of piercing the hardest rock likely to be encountered in boring, provided that care is taken to regulate the thickness of the boring-bar and the length of the stroke. Toward the termination of this special work of enlarging the diameter of the well, pieces were chipped off from the side-cutters, and the bottom was so hard and smooth that the scraper with a lip, which had been used hitherto to remove particles of steel, when turned around, carried these pieces with it without catching them. After many unsuccessful attempts were made with this tool, it was determined to use the power of adhesion. A frame-work of wrought iron, shaped like the frustum of a cone, was made, the diameter of its bore being an inch less than that of the well, and at the top of this was a male-screw. A tin form was made to fit over this frame, and when this was on the tool was inverted and a mixture of beeswax, rosin, tallow, and pitch was poured in while warm, the bottom, now the top, being smoothed down. This composition extended at least 6 inches below the frame, and when it had become so hard that it did not need the tin form, the latter was removed, the tool turned over and secured to the lowest section of the system of rods. It was then lowered into the well and pressed firmly against the bottom; the pieces of steel were thus imbedded in the composition, and by this means raised out of the well. This tool also furnished the means of obtaining an exact impression of the surface of the bottom of the well. The progress made this month in deepening the well was 5 feet 5 inches.

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The side-cutters and drills were now unfit for use, the latter having been drawn out and shaped so many times by the smith that there was nothing left to shape; it was therefore necessary to make new tools instead of manufacturing new drills and side-cutters like those hitherto used. Mr. Baudel proposed that certain modifications and changes, which experience had suggested to him, should be made in the manufacture of the new tools. The free falling-apparatus was retained, but the new drill and side-cutters presented the following advantages over those used up to this time. The drill was to be a separate tool from the one bearing the side-cutters; two tools were thus substituted for one. The former had a male-screw at the top of it which was screwed into a female-screw at the bottom of the plate-tool to which the side-cutters were attached; this arrangement increased the distance between the edge of the drill and the edges of the side-cutters. It was cheaper to manufacture, although it required more material. The drill could be removed by unscrewing it and sharpened without removing the side-cutters, and the side-cutters were more readily repaired. This combination was much stronger, offered greater resistance to the shock, and weighed 100 pounds more than the former tool. The side-cutters could not close in falling, and the plane of the drill could be set to make any angle with that of the cutters. This last advantage would enable us to avoid any tendency the tools might have to work to one side more than the other, and finally, the fragments of rock, dropped by the side-cutters, could not wedge themselves between the sloping upper sides of the drill and the walls of the well. The upper tool carries the side-cutters. It is made of iron 1¼ inches thick, and has a male-screw on the top. The lower extremity is a socket with a band shrunk on, containing a female-screw large enough to receive the screw on head of drill, and in the axis of this tool a slot is cut, 6 inches in length and 1 inch wide. The side-cutters work between two sliding steel plates, thirty-seven hundredths of an inch thick, one in front and the other in rear of this tool, and are held in place by four wrought-iron pins passing through both plates and cutters. The two lower pins work in slots in the plate, and the upper pins serve as centers on which the cutters swivel, so that a lateral motion can be given to them. These sliding-plates are held together by the four pins passing through cutters, two on each side, and one steel pin 1 inch in diameter, which passes through the center of the plate, the slot in the axis of the tool, and the eyes of the rods which work the plates vertically by means of a spiral spring attached to the rod of the free falling-apparatus. The sliding-plates are pressed down until the center pin reaches the bottom of the slot; when they are in this position the side-cutters hang in toward the axis of the tool, and it can be passed down the pipe; the plates are then secured by small wooden pegs passed through holes in the tool just above them. The first jar of the drill on the bottom snaps off each projecting end of these, and the spiral spring forces the plates up by means of the connecting rods, until they are arrested by the center-pin touching the top of the slot. The upward movement of the plates forces the side-cutters out on each side into their position for boring. The drill is made of iron armed with steel, and when inverted presents the appearance of two flanges, one at top and one at bottom, connected by a web. The new tools were manufactured in June; and as soon as they were completed, the work of enlarging the diameter of the well was resumed. The daily progress in this was slow, and on the 18th we met with an accident described below, the consequences of which might have cost time and money to repair.

While we were boring, the steel pins which fastened the side-cutters to the sliding-plates were broken, and the former remained in the well. Fortunately the experience which we had obtained in raising pieces of steel during the previous month by using the new extractor, taught us the best manner of relieving ourselves from this difficulty. This new tool answered our anticipations, and lifted these cutters, each weighing five pounds, 622 feet, holding them tight in its pitchy embrace for forty-five minutes. The daily distance bored varied from 1.5″ to 2.833″. This difference proves that the rock has not been homogeneous. The whole depth made this month was 30 feet 11 inches.

The results of the past year, though they have not equalled the hopes which had been entertained, have demonstrated that the tools now used are perfect, and that they possess the ability, when properly employed, to overcome difficulties which are not generally encountered in boring.

We should congratulate ourselves on our fortune in repairing the consequences of the accidents which have occurred without involving the Government in too much expense. The experience obtained has imbued us with greater confidence of success in boring, and of ultimately attaining the depth of the Stockton well, if necessary.

Some experts prophesy that we will obtain an overflowing well at a depth of 900 feet; others, that we shall have to go further for this great luxury. The well is 656 feet 1 inch deep.

The free falling-apparatus with new drill weighs 600 pounds; that is, 100 pounds more than the old one.

This fact will increase the quantity of action, making it equal at each stroke to 857 foot-pounds, and, as the average number of strokes per minute is 23, for that time it will be equal to 19,711 foot-pounds.

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The weight of drill-rods and tools to be raised each stroke for the present depth of well is 3,500 pounds.

The following are the amounts of time occupied in the different processes of boring:

	Minutes.
Lowering the drill	35
Raising the drill	45
Lowering the pump	2
Raising the pump	7

To attach and lower one section of pipe 10 feet long, two hours.

It is necessary to clean out the well twice a day, and on each occasion the pump has to be lowered and raised two or three times.

The above necessary operations consume much time and decrease proportionally the time occupied in making material progress in the depth of the well.

I shall abstain from submitting any anticipations in regard to the results that we may attain during the present year, only expressing my hope that the appropriation asked for under this head for the coming year may be regarded as the most important one appertaining to Benicia Arsenal.

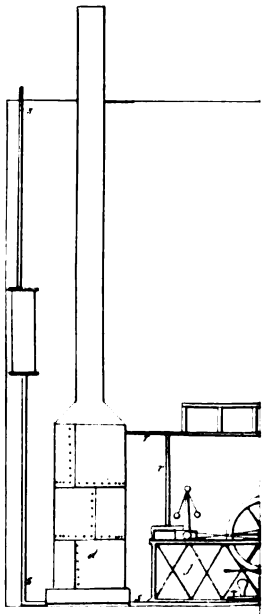
I am, sir, very respectfully, your obedient servant,

J. McALLISTER,
Major of Ordnance, Commanding.

The CHIEF OF ORDNANCE,
Washington, D. C.

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a-WELL-PIPE; *b*-LEVER; *c*-CYLINDE
AND PULLEYS, *h* COUNTER SHAFT
n-THREE LEAVED WOODEN SPRING C
RODS, *p*-NUT FOR SCREW *o*. *q* HA
TOWER; *n.n*-PULLEYS FOR HOISTING

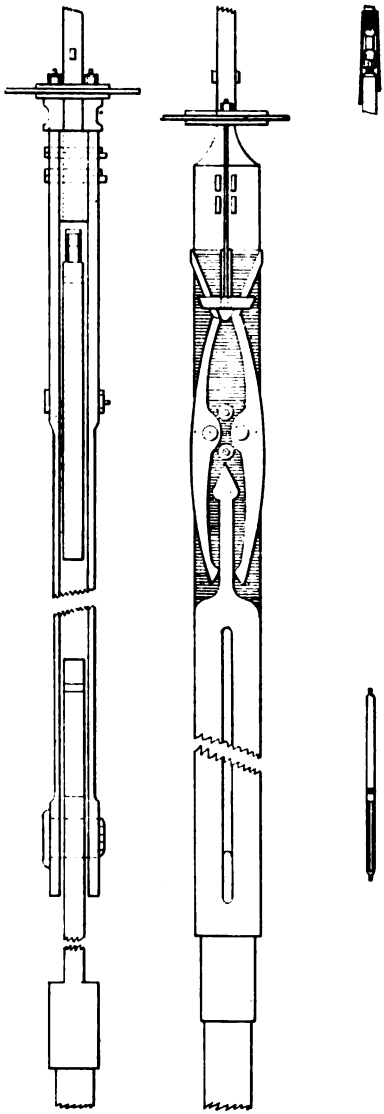
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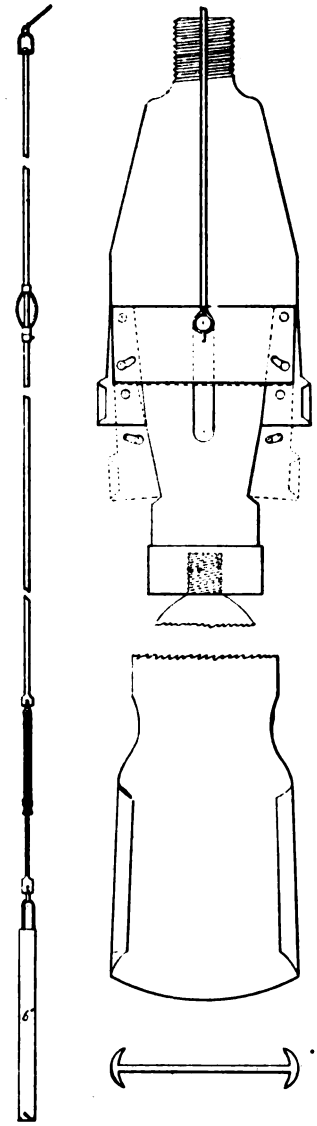
MACHINERY AT ARTESIAN WELL.

BENICIA ARSENAL.

FREE FALLING APPARATUS AND PUMP.



SIDE CUTTER TOOL AND DRILL.



H. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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APPENDIX K.

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, November 3, 1873.

SIR: The annual reports from this Office for the past few years have called special attention to the necessity of greater concentration of the manufacturing operations of this Department, the expediency of establishing a grand arsenal on the Atlantic seaboard, and a discontinuance of the many arsenals scattered over the country east of the Mississippi River. As Congress has not taken action on this very important subject, it has occurred to this Bureau that the next best course to pursue is to select one or more of our arsenals, concentrate our work thereat, and discontinue the others, or use such as Congress may not authorize the sale as mere depots for storage. A powder-depot and an experimental ground are also matters of vital importance, that have been frequently recommended for congressional action.

In order, therefore, to reach definite conclusions upon which to base recommendations supported by facts and figures, I have the honor to recommend that authority be granted this Bureau to convene a board of ordnance officers, to whom may be intrusted the examination and consideration of these matters, with instructions to report upon them in detail, with such recommendations as in their judgment may most satisfactorily meet our wants and demands.

Very respectfully, your obedient servant,
By order of the Chief of Ordnance:

S. V. BENÉT,
Major of Ordnance.

The Hon. the SECRETARY OF WAR.

Approved.

WM. W. BELKNAP,
Secretary of War.

NOVEMBER 5, 1873.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 7, 1874.

Proceedings of a board of officers convened in pursuance of the following orders, viz:

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, November 12, 1873.

A board, to consist of Lieut. Col. T. T. S. Laidley, Ordnance Department; Maj. S. Crispin, Ordnance Department; Maj. T. G. Baylor, Ordnance Department, will assemble at the United States ordnance agency, New York City, on the 3d of December, 1873, for the purpose of reporting on the best method of concentrating the manufacturing operations of this Department east of the Mississippi River, either by the establishment of a grand arsenal on the Atlantic seaboard, or the enlargement of and concentration of work in one or more of our arsenals, discontinuing the remainder of the arsenals, or retaining one or more as mere places of deposit.

Should it be determined to recommend that one or more arsenals be selected for manufacturing purposes, the board will name such as will best fulfill the wants of the Department, with the particular class of manufactures to be assigned to each. (Under the name of "arsenals" above is included the Springfield Armory.)

The board will also report on the subject of a powder-depot, and an experimental ground for heavy ordnance, recommending sites for each and their cost. In further-

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ance of these objects the board is authorized to visit and examine such localities as may be necessary upon which to form just conclusions.

It is desirable that its report embody every detail necessary to a proper and full understanding of these matters intrusted to their examination and study, that this Bureau may have complete information upon which to base a request for congressional action.

By order of the Chief of Ordnance:

S. V. BENÉT,
Major of Ordnance.

Lieut. Col. T. T. S. LAIDLEY,
Ordnance Department, Commanding Watertown Arsenal, President of the Board.

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, November 28, 1873.

Orders:

The board of ordnance officers, of which you are a member, convened by orders from this office under date of November 12, 1873, will not be assembled till further orders.

By order of the Chief of Ordnance:

S. V. BENÉT,
Major of Ordnance.

Lieut. Col. T. T. S. LAIDLEY,
Ordnance Department, Commanding Watertown Arsenal, President of the Board.

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, December 23, 1873.

Orders:

I. The board of ordnance officers ordered to convene at the ordnance agency, New York, under date of November 12, 1873, will assemble at the same place on January 7, 1874.

II. Lieut. Col. T. T. S. Laidley is relieved from duty on the above board on account of sickness, and Maj. T. J. Treadwell is placed upon it.

By order of the Chief of Ordnance:

S. V. BENÉT,
Major of Ordnance.

Maj. S. CRISPIN,
Commanding Ordnance Agency, New York.

The board met, pursuant to the last-mentioned order, at 12.30 p. m.; all the member present, when the above orders were read.

A letter (see Letter-book marked A, p. 1) was addressed to the Chief of Ordnance asking for a copy of report of board of ordnance officers convened in New York under instructions of Chief of Ordnance of October 6, 1866, for the purpose of selecting suitable sites for powder-depots.

* * * * * * *

A pamphlet, being a communication from the Secretary of War, dated December 8, 1862, to the chairman of Committee on Military Affairs, on the expediency of establishing near the harbor of New York a national depot or arsenal, &c., was submitted by Maj. S. Crispin, Ordnance Department. Read and filed, (marked C.)

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The board, at 3.15 p. m., adjourned to meet January 8, at 10 a. m.

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UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 8, 1874.

The board met pursuant to adjournment, all the members present.

The board first considered the subject of an experimental ground for heavy ordnance, and deemed, as some of the most essential requisites for such, an open, flat country, uninhabited, not intersected by highways or extensive water-courses, easy of access at all times by rail and water, and embracing a length of from seven to eight miles and a breadth of from one-half to one mile.

The board first turned its attention to the Government reservation at Sandy Hook, and, after inspecting such maps as could be obtained, decided on making a personal reconnaissance.

After examining some maps of Long Island, the board, at 4 p. m., adjourned to meet to-morrow at 10 a. m.

UNITED STATES ORDNANCE AGENCY, NEW YORK.
January 9, 1874.

The board met pursuant to adjournment. All the members present.

The letter and papers asked for by the board, in letter to the Chief of Ordnance, (page 2 of Letter-book,) were received, read, examined, and filed, (marked D.)

* * * * * * *

Arrangements were made to visit Sandy Hook to-morrow, to examine the ground there, with a view of ascertaining its suitableness for an experimental ground for heavy ordnance, and, at 4 p. m., the board adjourned to meet to-morrow, January 10, at 10 a. m.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 10, 1874.

The board met pursuant to adjournment; all the members present.

The board proceeded by steamer to Sandy Hook, and examined the ground there carefully, and on its return, at 5 p. m., adjourned to meet on Monday, January 12.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 12, 1874.

The board met pursuant to adjournment; all the members present.

* * * * * * *

A map of the Government reservation at Sandy Hook was directed to be prepared, to accompany the report of the board.

After discussion upon localities promising the most suitable and available experimental ground for heavy ordnance, it was decided to continue the reconnaissance of the coast of New Jersey, and also to inspect the coast of Long Island.

The board, at 4.30 p. m., adjourned, to proceed to-morrow to Long Branch and vicinity.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 13, 1874.

The board met at 10 a. m. at the ordnance agency, having found it impracticable to go to Long Branch and vicinity at this time, and, in order to take advantage of a fair day, decided to proceed to the valley of the Ramapo River, along the Erie Road, to examine the ground known as the "Augusta tract," which had been selected as a site for a powder-depot by the board of ordnance officers convened for this purpose October 6, 1866, as, from the report of this board, this locality seemed to possess in a remarkable degree all the essential requisites for a site of a powder-depot. The board accordingly visited this tract, and made a careful examination of it. On its return to New York, the board adjourned, to meet at 10 a. m., January 14, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 14, 1874.

The board met pursuant to adjournment; all the members present.

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The board, at 4 p. m., adjourned to meet at 10 a. m., January 15.

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UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 15, 1874.

The board met pursuant to adjournment.

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At 3 p. m. adjourned to meet at 10 a. m., January 22, 1874, at the United States Ordnance Agency, New York.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 22, 1874.

The board met pursuant to adjournment.

A copy of the report of the naval board on magazine-sites and magazines, forwarded by the Chief of Ordnance, U. S. A., in answer to the letter of the board of January 14, was received, read, and filed, (marked H.)

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A letter (p. 8, Letter-book) was addressed to the Chief of Ordnance, Washington, D. C., asking for certain information regarding those arsenals and armories which the board has under consideration.

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At 4 p. m. the board adjourned, to meet at 10 a. m., January 23, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 23, 1874.

The board met pursuant to adjournment.

A letter (p. 10, Letter-book) was addressed to P. Lorillard, esq., asking if he would dispose of the whole or part of the property known as the "Augusta tract," between Sufferns and Southfields, N. Y., and, if so, at what prices. Two sketches were inclosed, covering different areas.

The board had a reconnaissance made of such portions of Long Island as were presumed to have the requisites for an experimental ground for heavy ordnance, and examined the maps of the sites visited and agreed to visit them personally.

The board, after some general discussion on the subject of concentration of work at some of the principal arsenals, adjourned to meet at 10 a. m., January 24.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 24, 1874.

The board met pursuant to adjournment.

The board took up the subject of a site for a grand arsenal of construction, and after reading the annual reports of the Chief of Ordnance of 1869, 1870, 1871, and 1872, and the letter of the Secretary of War to the chairman of Committee on Military Affairs of the Senate, of December 8, 1862, with the report of the Chief of Ordnance of December 3, 1862, bearing on this subject, and some discussion on localities offering the most suitable requisites for such purpose, and an examination of the maps, deemed that the tract of country bordering on the Passaic River, north of the city of Newark, N. J., probably possessed most if not all the essential features, such as its vicinity to New York and Newark, where there are extensive manufacturing establishments, and easy and ready procurement of materials and workmen, security from foreign attack, and yet easy of access by rail and water. The board accordingly decided upon making a personal inspection as soon as practicable.

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The board at 3 p. m., adjourned to meet at 10 a. m., January 26.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 26, 1874.

The board met pursuant to adjournment.

The board determined upon visiting the portions of Long Island of which a reconnaissance had been made previously, and at 11 o'clock a. m., started for Babylon, L. I., and arriving there about 1 p. m., made an inspection of the country in the vicinity, and near Deer Park and beyond, some three miles, in a northeast direction.

DEER PARK, L. I., *January* 27, 1874.

The board continued its inspection and examined the ground along the Long Island Railroad to Brentwood, and from Brentwood in a southerly direction to Bay-Shore, on the South Side Railroad.

The board returned to New York in the evening, and adjourned to meet at 10.30 a. m., January 28, at the United States Ordnance Agency.

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UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 28, 1874

The board met pursuant to adjournment.

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A letter was received from Mr. Jas. P. Kernochan, agent of "Lorillard estate," asking the number of acres included in the sketches sent by the board January 10, 1874. Read and filed, (marked K.) A letter was sent in reply giving the information asked for, (p. 12, Letter-book.)

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The board at 4 p. m. adjourned to meet at 10 a. m., January 29.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 29, 1874.

The board met pursuant to adjournment.

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The board at 3 p. m. adjourned to meet at 10 a. m., January 30.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
January 30, 1874.

The board met pursuant to adjournment.

It having been determined to make an examination of that site for a grand arsenal for the Atlantic coast, alluded to in the proceedings of the 24th ultimo, the board visited Belleville, near Newark, N. J., and made a survey of the surrounding country, more particularly of the high ground extending north of Belleville between the Passaic and Hackensack Rivers, and directed a map of the proposed site and the surrounding country to be prepared.

The board at 4 p. m., adjourned, subject to the call of the president of the board, to await the information from the arsenals called for in its letter of January 22, 1874, to to the Chief of Ordnance.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
February 25, 1874.

The board met in pursuance of the call of the president assembling it on Wednesday 25, 1874.

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A letter from Mr. L. L. Lorillard, stating the price per acre that the Augusta tract could be purchased for, received, read, and filed, (marked B[1].)

The reports from the different arsenals, called for by the Chief of Ordnance in Ordnance Orders No. 6 of 1874, in response to the letter of board of January 22, 1874, having all been received, the board took them in order and read them; they were then filed and marked as follows: Pikesville, M; Allegheny, N; Kennebec, O; Columbus, P; Indianapolis, Q; Watertown, R; National Armory, S; Detroit, T; N. Y. Arsenal and Agency, U; Washington, V and Y; Frankford, W; Watervliet, X; Augusta Z; Fort Monroe, ZZ.

At 3.30 p. m., the board adjourned to meet at 10 a. m., February 26, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
February 26, 1874.

The board met pursuant to adjournment.

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The subject of providing for the concentration of the manufacturing operations of the Ordnance Department, by the enlargement of one or more of our arsenals, was taken up and the adaptability for this purpose of either Watertown, Watervliet, Frankford, or Springfield was discussed.

The board addressed a letter (p. 15, Letter-book) to the Chief of Ordnance, asking for the valuation of lands and buildings at the different arsenals under consideration.

The board adjourned at 3.30 p. m., to meet at 10 a. m., February 27, 1874.

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UNITED STATES ORDNANCE AGENCY, NEW YORK,
February 27, 1874.

The board met pursuant to adjournment.

The subject of concentrating the manufacturing operations of the Ordnance Department was resumed, and two plans were discussed.

1. Involving the establishment of a grand arsenal on the Atlantic seaboard, and the retention of the Springfield Armory, and also of certain other arsenals, as places of deposit.

2. Enlarging one of the present large arsenals, concentrating the work there, retaining Springfield Armory, and keeping other arsenals as depots.

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The board, at 3.30 p. m., adjourned to meet at 10 a. m., February 28, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
February 28, 1874.

The board met pursuant to adjournment.

A letter was received from the Chief of Ordnance, (marked C',) giving the valuation of land and buildings of certain arsenals called for in letter of the board of 26th instant.

A letter was addressed by the board (pp. 18 to 31, Letter-book) to each of the commanding officers of the following arsenals: Allegheny, Augusta, Columbus, Fort Monroe, Indianapolis, Springfield, Pikesville, Watertown, Watervliet, Detroit, New York, Frankford, Washington, and Kennebec, requesting to be informed, if practicable, of the original costs of the sites upon which located. A letter was addressed by the board to the Chief of Ordnance (p. 32, Letter-book) requesting authority to employ a civil engineer and such assistants as may be necessary to make surveys of such sites as it may select for arsenal, powder-depot, and proving-ground.

The board decided to proceed to Augusta Arsenal, Georgia, via Washington, D. C., and examine the grounds and buildings, and its capabilities of extension, with a view of ascertaining its advantages as a depot and arsenal of repairs for the South; and at 3.30 p. m., adjourned to meet at Washington, D. C., March 3, 1874.

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, D. C., March 3, 1874.

The board met pursuant to adjournment.

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At 3 p. m., the board adjourned to meet at the Ordnance Office at 10.30 a. m., March 4, 1874.

ORDNANCE OFFICE, WAR DEPARTMENT,
March 4, 1874.

The board met pursuant to adjournment.

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The board, at 3 p. m., adjourned to prosecute their visit to and inspection of Augusta Arsenal, Georgia.

AUGUSTA ARSENAL, GEORGIA, *March* 7, 1874.

The board met pursuant to adjournment, and proceeded to examine the grounds and buildings and the adjoining ground in vicinity.

A map was directed to be prepared, showing the railroad and water communications of the arsenal, and a letter (p. 55, Letter-book) was addressed to the commanding officer of the arsenal, asking for cost of workshops, an estimate of the cost of the two storehouses, two sets of quarters, barracks, &c.; also the price per acre of adjoining lands, and any other items of interest bearing on the importance of the Augusta Arsenal as a South Atlantic arsenal for storage and repairs.

The board, at 3.30 p. m., adjourned subject to the call of the president.

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FRANKFORD ARSENAL, PHILADELPHIA, PA.,
March 20, 1874.

The board met at this arsenal pursuant to the call of the president. Letters (p. 38, Letter-book) were directed to be sent to the commanding officers of the following arsenals, to wit:

Allegheny, Columbus, Detroit, Frankford, Indianapolis, Kennebec, Pikesville, Washington, Watertown, and Watervliet, requesting an appraisement to be made of the grounds and buildings at these arsenals, based upon the value of real estate in vicinity, and the adjudged value of buildings, and whether sold in lots of one or more tracts.

The commanding officer of Frankford Arsenal was further requested to have prepared a map of the arsenal, giving extent and depth of water-front, and also embracing two lots of land to the east of the arsenal, and another giving location of the arsenal with respect to the Delaware River and Atlantic coast, and showing its general facilities of railroad and water communication.

At 4 p. m., the board adjourned until 10 a. m., March 21, 1874.

FRANKFORD ARSENAL, PHILADELPHIA, PA.,
March 21, 1874.

The board met pursuant to adjournment.

A letter was sent to the superintendent of the United States Coast Survey, requesting him to furnish the board with maps and charts of the Delaware River from its mouth to Pennypack Creek, (p. 42, Letter-book.)

The board made an inspection of the grounds, with a view of ascertaining the susceptibility of enlargement of the arsenal, and its general advantages when so enlarged, as the proposed arsenal on the Atlantic coast. Steps were taken to ascertain the prices of the adjoining lands with a view to enlargement, and at 4 p. m., the board adjourned till March 23, 1874.

FRANKFORD ARSENAL, PHILADELPHIA, PA.,
March 23, 1874,

The board met pursuant to adjournment, and continued its inspection of the grounds and buildings of the arsenal, and at 3 p. m. adjourned to meet at the United States Ordnance Agency, New York, March 24, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
March 24, 1874.

The board met pursuant to adjournment; Maj. T. J. Treadwell, Ordnance Department, absent.

Letters from the following arsenals, viz: Pikesville, Allegheny, Kennebec, Columbus, Springfield, Frankford, Indianapolis, Detroit, Augusta, Fort Monroe, Watervliet, Washington, and New York, (United States ordnance agency, New York,) which had been received during the absence and adjournment of the board in answer to its letter of the 28th ultimo, were read and filed, (marked from E′ to Q′.)

A letter from the commanding officer of Watertown Arsenal, in answer to letters from the board dated February 23 and March 20, 1874, was received, read, and filed, (marked R′.)

A letter from the commanding officer of Watervliet Arsenal to Acting Chief of Ordnance, reporting that he had furnished certain information to the House Military Committee, required by them, and now presenting for consideration of the Department his views relative to the importance of the position of that arsenal as an arsenal of construction, was received, having been referred to the board by the Acting Chief of Ordnance; read and filed, (marked S′.)

The letter of board dated February 28, 1874, to the Chief of Ordnance, requesting authority to employ a civil engineer and assistants to make surveys of sites for arsenal, proving-ground, and powder-depot was returned with indorsement granting authority asked for; filed, (marked T′.) Steps were taken at once to procure a suitable engineer and surveying party, and instructions were prepared for his guidance.

A letter, with map, from the commanding officer of Augusta Arsenal was received in answer to memorandum and letter of the board of March 7, 1871, giving cost of buildings, adjoining lands, &c., and showing the railroad and water communications; read, examined, and filed, (marked U′.)

The board, at 4 p. m., adjourned to meet at 10.30 a. m., March 25, 1874.

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UNITED STATES ORDNANCE AGENCY, NEW YORK,
March 25, 1874.

The board met pursuant to adjournment; Maj. T. J. Treadwell, Ordnance Department, absent.

Mr. H. N. Babcock, civil engineer, was procured, through the courtesy of Gen. G. K. Warren, United States Engineers, to make the necessary surveys required by the board; and verbal and written instructions (p. 43, Letter-book) were given him in reference to the site for a powder-depot.

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At 3 p. m., the board adjourned to meet at 10 a. m., March 26, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
March 26, 1874.

The board met puruant to adjournment; all the members present.

A letter from the commanding officer of Pikesville Arsenal, giving his estimate of value of land and buildings, if sold, in answer to letter of board of March 20, 1874, received and filed, (marked V'.)

A letter was received from commanding officer of Frankford Arsenal correcting errors in letter of March 5, 1874, in reference to original cost of land and buildings; filed. Letter of March 5 withdrawn and this letter substituted.

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The board decided upon visiting Watervliet Arsenal, Springfield Armory, and Watertown Arsenal in connection with the business before it, and at 2 p. m., adjourned to meet at Watervliet Arsenal as soon as practicable.

WATERVLIET ARSENAL, WEST TROY, N. Y.,
March 27, 1874.

The board met pursuant to adjournment, and proceeded to inspect the grounds and buildings at this arsenal, and also the contiguous grounds to the west of the arsenal available, if so desired, for addition to the present site.

At 2.30 p. m., the board had completed its inspection, and adjourned to meet at the National Armory, Springfield, Mass., March 28, 1874.

NATIONAL ARMORY, SPRINGFIELD, MASS.,
March 28, 1874.

The board met pursuant to adjournment, and after discussing the points to be examined, at 4 p. m., adjourned to meet at the armory at 11 a. m., March 30, 1874.

NATIONAL ARMORY, SPRINGFIELD, MASS.,
March 30, 1874.

The board met pursuant to adjournment, and inspected the shops and grounds o n the hill, the water-shops and the adjacent grounds, and the grounds proposed to be procured as a preliminary proving-ground for heavy ordnance.

At 4 p. m., the board, having completed its inspection, adjourned to meet at Watertown Arsenal, Mass., March 31, 1874.

WATERTOWN ARSENAL, WATERTOWN, MASS.,
March 31, 1874.

The board met pursuant to adjournment.

Surveyed the buildings and grounds, and also the adjoining lands available for extension.

Having completed its inspection, at 4 p. m., the board adjourned to meet at the United States Ordnance Agency, New York, April 1, 1874.

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UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 1, 1874.

The board met pursuant to adjournment.

Letters were received from the commanding officers of the following-named arsenals, to wit, Allegheny, Columbus, Frankford, Kennebec, and Indianapolis, (marked, respectively, W′, X′, Y′, Z′, A″,) in answer to letter of board of the 20th ultimo, giving an appraisement of the grounds and buildings at these arsenals if sold in lots or in one or more tracts. A letter (and map) was received from the commanding officer of Frankford Arsenal, giving extent and depth of water-front of the Government reservation on the Delaware River, and also of the two adjoining farms to the east of the arsenal; and also the location of arsenal with respect to the Delaware River and Atlantic coast, and showing its general facilities for railroad and water communication. Filed, (marked B″.)

Mr. H. N. Babcock presented himself, and stated that he had made preliminary surveys of several sites for powder-depot; and was directed to make a report in writing to the board of his operations for its information.

The charts asked for in letter of board of 30th ultimo were received from the Superintendent of United States Coast Survey. Filed, (marked C″.)

At 3 p. m., the board adjourned to meet at 10 a. m., April 2, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 2, 1874.

The board met pursuant to adjournment.

The report of Mr. H. N. Babcock, civil engineer, on preliminary surveys of the sites for a powder-depot was read for the information of the board, and three of the sites were selected as promising the most advantageous positions; and the board decided upon visiting these with a view of selecting the most favorable for accurate survey.

The selection of a site for an experimental firing ground for heavy ordnance was next taken up, and it was decided to direct Mr. H. N. Babcock to make preliminary surveys along the Jersey coast, and a letter of instructions was accordingly prepared for his guidance, (p. 49, Letter-book.)

At 3 o'clock the board adjourned to meet at 10 a. m., April 3, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 3, 1874.

The board met pursuant to adjournment.

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At 3 p. m., the board adjourned to meet at 10 a. m., April 4, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 4, 1874.

The board met pursuant to adjournment.

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Reply to letter of the board of March 20, 1874, asking for estimated value of lands and buildings, &c., was received from commanding officer of Watervliet Arsenal; read and filed, (marked D″.)

The board, as an adjunct to its report, directed maps of all the arsenals under consideration, of convenient scale, to be prepared from those that had been forwarded to the board by the different commanding officers.

At 3 p. m., the board adjourned to meet at 10 a. m., April 6, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 6, 1874.

The board met pursuant to adjournment; Maj. T. J. Treadwell, Ordnance Department, absent.

A letter from the commanding officer of Detroit Arsenal, in answer to letter of board of 20th March, 1874, giving appraised value of lands and buildings at that arsenal, received, read, and filed, (marked E″.)

A programme for the week was arranged, and Mr. Stultz was directed to proceed to Belleville, N. J., to make some inquiries in regard to the site for grand arsenal.

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At 3 p. m., the board adjourned to meet at 10 a. m., April 7, 1874.

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UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 7, 1874.

The board met pursuant to adjournment; Maj. T. J. Treadwell, Ordnance Department, absent.

A visit to and inspection of the site selected near Belleville, N. J., for the grand arsenal on the Atlantic coast, with a view of more definitely locating it and having a thorough survey made of it, was decided upon, and the board agreed to set apart tomorrow, April 8, for this purpose.

At 3 p. m., the board adjourned to meet at Belleville, N. J., April 8, or as soon as practicable.

BELLEVILLE, N. J., *April* 8, 1874.

The board met pursuant to adjournment. All the members present.

That section of the country near the city of Newark, N. J., located between the Passaic and Hackensack Rivers, and extending northward from Newark, more particularly of the high ground north, from two to three miles of Belleville, N. J., visited by the board January 30, 1874, was again examined, and two eligible sites for the grand arsenal for the Atlantic coast selected with a view of accurate survey and inquiry as to their being attainable by the United States Government.

After completing these examinations the board adjourned to meet at 10 a. m., April 9, near the town of Sufferns, Rockland County, New York State.

SUFFERNS, N. Y., *April* 9, 1874.

The board met pursuant to adjournment.

Three sites selected under the instructions of the board of March 25, 1874, by Mr. H. N. Babcock, were examined with a view of determining their suitableness for a powder-depot; one located two miles northeast of the village of Ramapo, in the valley of a small stream emptying into the Ramapo River at the village of Ramapo, and the other two situated from two to three miles northeast of Sloatsburgh, in the valley of Stony Brook, a branch of the Ramapo, joining the latter at Sloatsburgh.

After completing the inspection the board adjourned to meet at the United States ordnance agency, New York, at 10 a. m., April 10, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 10, 1874.

The board met pursuant to adjournment.

A letter from the commanding officer of the National Armory, Springfield, Mass., was received, submitting a plan for the manufacture of small-arm cartridges in the event of the transfer of this manufacture to the armory; read and filed, (marked F".)

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At 3 p. m., the board adjourned to meet at 10 a. m., April 11, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 11, 1874.

The board met pursuant to adjournment.

Mr. H. N. Babcock presented himself, and stated that he had made the preliminary surveys for an experimental firing-ground along the Jersey coast, in pursuance of the instructions of the board of April 2, 1874, and he was directed to make a report in writing, with sketch for the information of the board.

At 3 p. m., the board adjourned to meet at 10 a. m., April 13, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 13, 1874.

The board met pursuant to adjournment; Major T. J. Treadwell, Ordnance Department, absent.

The report of Mr. H. N. Babcock on the preliminary surveys of sites for an experimental ground for heavy ordnance was received and read for the information of the board.

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It was determined to make a personal reconnaissance of these sites, and Mr. Babcock was requested to go with the board for this purpose April 14.

A letter of instructions (p. 51, Letter-book) was written to Mr. Babcock to make surveys of the sites for grand arsenal on the Atlantic coast examined by the board April 8, 1874.

At 3 p. m., the board adjourned to meet at Tom's River, New Jersey, as soon as practicable.

TOM'S RIVER, NEW JERSEY,
April 14, 1874.

The board met pursuant to adjournment; Major T. J. Treadwell, Ordnance Department, absent, sick.

Island Beach was visited, opposite the mouth of Tom's River, and the general features of the beach examined, especially as to width and differences of level.

After completing this inspection, the board adjourned to meet at Point Pleasant, N. J., April 15, 1874.

POINT PLEASANT, N. J., *April* 15, 1874.

The board met pursuant to adjournment; Maj. T. J. Treadwell, Ordnance Department, absent, sick.

The upper part of Island or Squan Beach was visited south of Manasquan Inlet, and the general features of the beach examined from this point for some two miles in a southwardly direction; also, the facilities and means of access to the beach around the head of Barnegat Bay. After completing these inspections the board adjourned to meet at the United States ordnance agency, New York, at 10 a. m., April 16, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 16, 1874.

The board met pursuant to adjournment. All the members present.

A letter of instructions (p. 53, Letter-book) for the survey of the sites for a powder-depot was prepared for Mr. H. N. Babcock.

A letter (p. 54, Letter-book) was addressed to the Chief of Ordnance asking that the Superintendent of the United States Coast Survey be requested to furnish the board, for its information, with maps or charts of the coast of New Jersey from Sandy Hook to Cape May, and that the Chief of the Signal-Service Department be requested to furnish the board all the meteorological information in his possession of this coast, as regards force and strength of winds, variations of temperature, and occurrence of storms and foggy weather.

A letter inclosing map of vicinity of Frankford Arsenal was received from commanding officer, in answer to letter of board of March 20, 1874, filed, (marked G".)

At 3 p. m., the board adjourned to meet at 10 a. m., April 17, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
April 17, 1874.

The board met pursuant to adjournment.

A letter of instructions for the survey of the sites for an experimental ground for heavy ordnance on the Jersey coast, selected by the board, was prepared for the guidance of Mr. H. N. Babcock, and he was directed to make the surveys as soon as he has finished the other surveys ordered by the board.

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Awaiting the completion of the surveys and of the maps ordered by the board, it adjourned at 3 p. m., subject to the call of the president.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 3, 1874.

The board met pursuant to the call of the president. All the members present.

A letter, dated April 18, 1874, from the Chief Signal-Officer of the Army to the Chief of Ordnance, in answer to letter of board of April 12, 1874, concerning meteorolog-

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ical phenomena on the Jersey coast, from Sandy Hook to Barnegat Inlet, received during the adjournment of the board, was read and filed, (marked H".)

A letter from the Superintendent of the United States Coast Survey to the Chief of Ordnance, inclosing charts of Jersey coast, in answer to letter of board of April 17, 1874, received during the adjournment of the board, read and filed, (marked I".)

A letter from the commanding officer of Washington Arsenal, in answer to a letter of board of March 20, 1874, giving the appraised value of lands and buildings at that arsenal, received during the adjournment of the board, read and filed, (marked J".)

The maps of the different arsenals and surveys of sites for grand arsenal on the Atlantic coast, experimental ground for heavy ordnance, and powder-depot, which had been ordered, and as far as completed, during the adjournment of the board, were examined and discussed.

A letter from L. L. Lorillard, esq., received during the adjournment of the board, stating that he was no longer willing to sell the Augusta tract for the price named in his letter to the board, (marked B',)was read and filed, (marked K".)

At 3 p. m., the board adjourned to meet at 10 a. m., June 4, 1874.

UNITED STATES ORDNANCE AGENCY NEW YORK,
June 4, 1874.

The board met pursuant to adjournment.

A statement of the original cost and estimated value of certain United States arsenals east of the Mississippi River, was prepared for the information of the board. (Appended A A.)

The board discussed the features of the report to be made on the best mode of concentrating the manufacturing operations of the Ordnance Department east of the Mississippi River. In this connection Mr. H. N. Babcock submitted his report on the Belleville site, which had been previously selected by the board; read and filed, (marked L".)

At 3 p. m., the board adjourned to meet at 10 a. m., June 5, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 5, 1874.

The board met pursuant to adjournment, and again took up the subject of its report on the best mode of concentrating the manufacturing operations of the Ordnance Department.

Mr. H. N. Bacock, civil engineer, submitted a report on the survey of a site for an experimental ground for heavy ordnance on Squan Beach, also known as Island Beach, New Jersey; read and filed, (marked M".) He also submitted his report on a powder-depot site near Sloatsburgh, N. Y., read and filed, (marked N",) and the board determined to visit it to-morrow, June 6.

At 3 o'clock p. m., the board adjourned to meet at Sloatsburgh, N. Y., June 6, 1874.

SLOATSBURGH, N. Y., *June* 6, 1874.

The board met at this place and inspected the site for powder-depot referred to in Mr. Babcock's report. After completing this inspection the board adjourned to meet at the United States Ordnance Agency, New York, at 10 a. m., June 8, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 8, 1874.

The board met pursuant to adjournment.

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The board continued the preparation of its report on the best method of concentrating the manufacturing operations of the Ordnance Department, and at 3 p. m., adjourned to meet at 10 a. m., June 9, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 9, 1874.

The board met pursuant to adjournment.

Mr. H. N. Babcock was directed to make a rough survey of another site for a powder-depot near Sloatsburgh, N. Y.

The preparation of the report of the board was resumed and continued until 4 p. m., when the board adjourned to meet at 10 a. m., June 10.

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UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 10, 1874.

The board met pursuant to adjournment.

Mr. H. N. Babcock presented his report on the additional powder-depot site, ordered by the board June 9; read and filed, (marked O''.)

The board continued the preparation of its report, and at 4 p. m., adjourned to meet at 10 a. m., June 11, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 11, 1874.

The board met pursuant to adjournment.

The preparation of the report of the board was resumed, and that portion of it relating to the concentration of the manufacturing operations of the Ordnance Department by the establishment of a grand arsenal on the Atlantic seaboard was completed.

At 4 p. m., the board adjourned to meet at 10 a. m., June 12, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 12, 1874.

The board met pursuant to adjournment.

The preparation of the report of the board was continued, and that portion of it relating to the concentration of the manufacturing operations of the Ordnance Department, by the enlargement of one or more of our present arsenals, was completed.

At 3.30 p. m., the board adjourned to meet on Monday, June 15, at the United States Ordnance Agency as early as practicable.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 15, 1874.

The board met pursuant to adjournment.

The preparation of the report of the board on site for powder-depot was taken up and concluded.

At 3 p. m., the board adjourned to meet at 10 a. m., June 16.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 16, 1874.

The board met pursuant to adjournment.

The preparation of the report of the board on experimental ground for heavy ordnance, was taken up and considered.

At 3 p. m., the board adjourned to meet at 10 a. m., June 17, 1874.

UNITED STATES ORDNANCE AGENCY, NEW YORK,
June 17, 1874.

The board met pursuant to adjournment.

The preparation of its report on the experimental ground for heavy ordnance was resumed and report completed.

At 3 p. m., the board having no further business before it, adjourned *sine die*.

OPINIONS AND RECOMMENDATIONS OF THE BOARD

"On the best method of concentrating the manufacturing operations of this Department east of the Mississippi River, either by the establishment of a grand arsenal on the Atlantic seaboard or the enlargement of, and concentration of work in, one or more of our arsenals, discontinuing the remainder of the arsenals, or retaining one or more as mere places of deposit."

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PLAN 1.

The Ordnance Department, for nearly the last thirty years, in the performance of the various duties intrusted to it by law, under the Secretary of War in the manufacture and procurement of all ordnance and ordnance stores for armies called into the field at different times during this period, also in the providing of warlike stores for the prospective wants of future armies, the armaments and material for sea-coast defenses, the material for arming and equipping militia, and the performance of the important experimental duties intrusted to its care, has experienced during this period more or less serious embarrassment, not only from the inadequacy of existing facilities at the present arsenals of construction, but from their locations and limited resources, necessitating the conduction of the manufacturing operations at different points, widely separated, and being more or less objectionable on account of transportation, procurement of labor and material, and at the loss of the evident economy of a judicious concentration of ordnance manufactures.

Our present arsenals of construction, located between the Mississippi River and Atlantic Ocean, are widely scattered from Maine to Georgia. This policy of location was necessary at the time of their establishment, when but few, if any, railroad means of transit existed in our country, and when it was important, from this cause, that equipment of troops should be made at or near the localities where raised.

But at the present day, when our elaborate and perfected railroad and telegraph systems of communication have rendered the question of distance one of but secondary importance, we can now take advantage of these improvements, and subserve the true interests of economy, perfect our products, and attain the other manifest advantages of a policy of centralization by a concentration at one grand arsenal of the most important manufacturing operations of the Department.

The great importance of carrying out this policy at a "grand arsenal on the Atlantic seaboard" has been fully recognized and urged in the report of the Chief of Ordnance of December 3, 1862, and repeatedly pressed upon the notice of the War Department, and the action of Congress earnestly recommended in the subsequent annual reports of this Office from 1869 to 1873.

The first consideration in the location of an arsenal of construction, to effect these ends is, evidently, that it should occupy a comparatively central geographical position with respect to the Atlantic seaboard, and have at command the facilities of one of our great commercial centers.

The pre eminence of the city of New York, in its gigantic means for transit and for prompt distribution of all warlike stores to all points of the United States, its unsurpassed resources in labor and material, and its advantages in a geographical point of view over any city on our coast as a distributing point, renders the location of an arsenal-site in its vicinity, if practicable, of the greatest importance; and accordingly the board has directed its examination particularly to this section of the country.

A consideration and examination of the surroundings of New York point conclusively to the immediate north of Newark, N. J., as the section of country possessing the best advantages, and as being most eligible and desirable for locating the proposed arsenal.

The land here, bordering on the Passaic River, rises from the level of the river to a height of over 100 feet, and then gradually slopes eastward to the meadow-lands bordering on the Hackensack.

The character of the ground gives it natural features of defense, and this, added to its location (see Map 1) with respect to important works of defense of New York Harbor, and its freedom from the possibility of naval attack, are considerations of the highest importance.

The diverging main lines of railroad from Jersey City and Hoboken, at present eleven in number, bring this site in close and rapid communication with New York and the country at large, and the water-facilities of the Passaic and Hackensack are available for transportation of supplies to and from the harbor of the commercial metropolis of our country.

A special site on this ground has been selected and surveyed (see report of Mr. H. N. Babcock marked L") and is represented in detail on map marked 2.

Its location with respect to New York City, Newark, and the surrounding country, also with respect to railroad and water means of transit with New York, is shown by the accompanying map, marked 3.

It will be seen (Map 3) that this site is distant about * * from New York, and about three miles from the suburbs of Newark. It has a frontage on the Passaic of * * * * * , and extending eastward, as it does, from the Passaic River to the Hackensack meadows, it thus has access to both rivers.

A short line of railroad * * * will connect the site with the railroad-system of the country, and at a slight cost of construction, owing to the level character of the adjacent lands.

* * * * * * *

A suitable proof-ground for ordnance adjoining the arsenal-site is shown on Map 3,

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and marked (PG.) * * * It would constitute a valuable adjunct to the arsenal, and it is recommended that it be secured if the site for the latter be approved and purchased.

The above-recommended purchases do not provide for storage-depots on the waters of New York Harbor, to be especially utilized in times of war. Our recent past experience in the rebellion has shown that such facilities can be readily extemporized when needed from buildings and wharfages already existing for ordinary commercial purposes in New York Harbor, and at a less cost than would be incurred in their permanent provision by the Government.

It would appear, from the above considerations and facts, that a "grand arsenal" of construction can be located, at a reasonable and moderate cost, on the Atlantic coast, and at the most desirable point for the concentration of ordnance manufactures.

In view of this fact there remains to be considered and determined the proper distribution of the duties of the Department, based upon the early establishment of this arsenal, and the proper disposition of such arsenals as its erection will render no longer needed for the services of the United States.

The arsenals and armories now established east of the Mississippi River are as follows, to wit:

Kennebec Arsenal, Augusta, Me.
Watertown Arsenal, Watertown, Mass.
Springfield Armory, Springfield, Mass.
Watervliet Arsenal, West Troy, N. Y.
New York Arsenal, Governor's Island, New York Harbor.
Pikesville Arsenal, Pikesville, Md.
Frankford Arsenal, Philadelphia, Pa.
Washington Arsenal, Washington, D. C.
Fort Monroe Arsenal, Old Point Comfort, Va.
Augusta Arsenal, Augusta, Ga.
Indianapolis Arsenal, Indianapolis, Ind.
Columbus Arsenal, Columbus, Ohio.
Allegheny Arsenal, Pittsburgh, Pa.
Detroit Arsenal, Detroit, Mich.

The principal manufacturing operations of the Department are now performed at the following arsenals, to wit: Watertown, engaged in the production of sea-coast carriages and projectiles for heavy guns; Springfield Armory, with the manufacture of small-arms; Watervliet, in the manufacture of leather-work; Frankford Arsenal, in small-arm ammunition, and Fort Monroe Arsenal, in sea-coast carriages and on experimental duties. The remaining arsenals in the above list are either engaged in small repairs or are simply storage-depots for the care and preservation, issue and receipt of ordnance and ordnance stores. It is believed that, except small-arms and small-arm ammunition, the more important ordnance and ordnance stores, more especially those for field and siege artillery, and those to be provided for the use of our sea-coast defenses, such as cannon, heavy sea-coast carriages, projectiles and ammunition, and other stores and appliances for their service and maneuver, also harness and the more elaborate articles of leather-work, should all be made at the grand arsenal of construction.

The manufacture of our small-arms and small-arm ammunition for our present armies and militia, and for our reserve-supply, is one of the greatest importance, and as the Springfield Armory is a model one of the world in the perfection of its fabrications, and the extent and completeness of its arrangements and facilities for the production of this class of warlike stores, the board regards the retention of this establishment as a foregone conclusion, in its proposed plan for concentration, for the fabrication of its present specialty, and such other work as its facilities may accommodate. Recognizing also the almost imperative necessity, in order to secure perfection in production in the fabrication of small-arms and small-arm ammunition, that they should be produced side by side, the board is of the opinion that arrangements should be made for the transfer of the present manufacturing operations of small-arm cartridges at Frankford Arsenal to the Springfield Armory as early as it can be accomplished with economy and with a due regard to other important public interests. The more simple leather-work fabrications of infantry and cavalry accouterments, and perhaps some other kinds, all demanded in quantity, and requiring little but no special appliances for their manufacture, can, it is thought, be economically and judiciously made at one of our present arsenals. The board recommends the retention of the Frankford Arsenal for this purpose. Its geographical position and its facilities of shops and store-houses and for material and labor of the kind required, its means of transit and its close and quick connection with the proposed grand arsenal at Newark, N. J., point conclusively to its retention for the purpose suggested, and as part of the proposed plan for concentration.

It will be seen that the design contemplated by the board is to concentrate all the principal manufacturing operations of the Department at the proposed grand arsenal, the Springfield Armory, and at Frankford Arsenal.

It remains now to designate those arsenals which it is proposed shall be retained to meet the wants of the country as arsenals for storage and repair, and those to be used simply as depots for the care, preservation, receipt, and issue of warlike stores.

A careful and mature consideration of the question leads the board to recommend the retention of the following arsenals, to wit: Augusta and Fort Monroe as arsenals

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ot storage and repair, and Kennebec, New York, and Indianapolis Arsenals as depots for storage and issue. This will leave to be sold the Watertown, Watervliet, Pikesville, Washington, Allegheny, Columbus, and Detroit Arsenals.

The reasons for the retention of the above arsenals, as recommended by the board, are as follows, to wit:

Augusta Arsenal.—This is the only arsenal left in the entire South, east of the Mississippi, and the nearest constructing arsenal to it in the proposed plan will be nearly eight hundred miles distant. Its retention, and improvement, and sufficient enlargement to render it adequate to supply the needs of the Department in the South, in the opinion of the board is a matter of wisdom, and in fact a necessity. The proposed improvements and enlargement (see memorandum letter of board addressed to Captain Hill March 7, 1874, official copy of which was sent to that officer March 16, 1874, and the report of that officer dated March 16, 1874) can be secured at a moderate cost. Its present workshops and buildings are in excellent condition, are sufficiently large in plan to be utilized almost without cost in the remodeling of the arsenal as one for storage and repair. The location, inland, is one of the best in the South, both geographically and in its rail and water facilities, for the reception and distribution of supplies for the South. These and its other advantages for the purposes required, (see Captain Hill's report,) and its general healthfulness, further confirm the board in its opinion as to the propriety and necessity of retention of the Augusta Arsenal. Its general plan and its location with respect to Augusta City is given in the accompanying map marked 4.

Fort Monroe Arsenal, Virginia.—This arsenal is located on a Government reservation, and its connection with Fort Monroe renders its sale impossible. It is well provided with shops and machinery, and is admirably situated geographically on the waters of Hampton Roads for fitting out expeditions, as was shown in the late war.

The arsenal as it now exists, however, is considerably scattered over the Government reservation, and, as a matter of economy and efficiency, it is recommended by the board that all the arsenal property inside the fort, consisting of quarters, barracks, and office, be turned over to the garrison of Fort Monroe. The store-houses and other temporary buildings should be torn down and the materials applied, as far as practicable, to the erection of suitable structures rendered necessary by this action, outside the fort in the vicinity of its shops. The necessary buildings required to be erected by this plan would cost but little additional to the value of the material obtained by the removal of the store-houses and buildings inside the fort. The buildings inside the fort should not be abandoned or turned over until their places are supplied by suitable structures contemplated to be erected outside the fort.

Kennebec Arsenal.—This arsenal is situated on our northeastern frontier, bordering on Canada, is well located, has the requisite facilities, and is deemed necessary for retention to supply the present and prospective wants of that section of our country.

New York Arsenal.—This arsenal, located on the glacis slope of Fort Columbus, Governor's Island, is not available for sale. Whilst incapable of and having no manufacturing facilities, yet it has comparatively extensive storage capacity and wharfage, and superior facilities, from its location in New York Harbor, for the distribution of supplies, and will thus form a valuable adjunct for storage in connection with the proposed grand arsenal.

Indianapolis Arsenal.—The construction of a large arsenal on the Atlantic coast and the disestablishment of the interior ones—Allegheny and Columbus—will leave, it is believed, too great an area of country between the Atlantic coast and the Rock Island Arsenal (the proposed arsenal and armory of the valley of the Mississippi) unprovided with an ordnance-depot, and hence the board recommend the retention of the Indianapolis Arsenal as one for storage and issue to meet the wants of the northern lake frontier and the central portion of our country lying to the immediate west of the Atlantic States. Indianapolis is a great railroad center; its other facilities are prominent, and the present arsenal at this point has in its substantial and capacious storehouses and other advantages all that is needed for the purpose required.

In order to inaugurate this general plan for concentration the board recommend that Congress be asked to make the necessary appropriations for the immediate purchase of the site for the grand arsenal proposed, and for the erection of suitable buildings immediately required thereon, and to enact a law authorizing the sale of the arsenals above designated.

The arsenals that can be soon prepared for disposition are Washington, Allegheny, Columbus, Detroit, and Pikesville. The following arsenals should be disposed of at such times as the stores now manufactured at them can be provided for at the grand arsenal, viz: Watertown Arsenal, Massachusetts, and Watervliet Arsenal, New York. It is apparent that no sales should be made until the Department is fully prepared elsewhere to replace the facilities lost by the disposal of any of our arsenals.

It is evident that any judicious plan for the disposition of even those arsenals most available at present for sale, under the above-proposed arrangement of the ordnance facilities for the United States, would require two or three years for consummation, and hence the necessity of appropriations by Congress to secure the site for the con-

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templated "grand arsenal," and its preparation for buildings; the erection of some, and the making of improvements required at its initiation, cannot but be apparent.

It should be provided by law that the net proceeds of all sales of our arsenals should be used in building up the "grand arsenal." The present estimated cost of the arsenal-site and adjacent proof-ground is $262,275.

To purchase this site and to provide for improvements and buildings which should and can be provided during the first year, it is recommended that Congress be asked at its next session for an appropriation adequate to secure the site and proof-ground, and an additional sum not exceeding $500,000 for such improvements and structures as the Department may deem best and most expedient to at first provide.

The accompanying statement, prepared from the reports of the commanding officers, appended, marked AA, shows an estimated return from the sale of those arsenals which can be most readily prepared for disposition at present, (if the proposed plan is adopted,) in the aggregate of $2,109,590.56, and that the proceeds of the two remaining ones, Watertown and Watervliet, whose disposition must be at least delayed until they are fully superseded by the proposed new arsenal, will be $1,414,237. Valuable machinery now on hand at the arsenals recommended to be sold and dismantled can be utilized at the "grand arsenal." The grand aggregate resulting from the contemplated sales will be $3,526,827.56. This amount will undoubtedly go far towards, if not be entirely adequate for the full accomplishment of the contemplated concentration of our ordnance manufactures and facilities, and at a point whose superior local, geographical, and other advantages seem to demand centralization; and when we consider the undoubted improvements to be attained, the ease with which they can be secured, and the prospectively small outlay required, it is believed that sound judgment and a wise economy will point to the importance of an early accomplishment of this proposed distribution of the duties of the Ordnance Department of the United States.

PLAN 2.

While the board is unanimous in the opinion that the foregoing plan will in the best and most satisfactory manner economize and perfect the manufactures of the Department, and otherwise provide for its wants east of the Mississippi, yet it feels called upon, under the orders convening it, to submit another arrangement for concentration, based upon the extension of the grounds and the enlargement of the manufacturing and storage facilities of one of our large arsenals of construction, in lieu of the establishment of a new one.

The board finds this a difficult, if not impossible, problem to satisfactorily solve, owing to the want of a decided pre-eminence in the important essentials requisite at any one of our present arsenals of construction. The one best adapted for this purpose and possessing greater advantages than any other, from its central geographical position with respect to the Atlantic coast, (see map marked No. 23,) easy and ready procurement of labor and material, and from its facilities for storage, transportation, and distribtion of its products, is the Frankford Arsenal. Its enlargement is practicable, as the adjoining farms (see appended map, marked 5, and report of the commanding officer) can be purchased.

* * * * * * *

The water-frontage of Frankford Arsenal on the Delaware can be made available for transportation, and the grounds can be readily connected by rail with the great railroad-system of our country.

Its geographical position is by no means as acceptable as the proposed site near New York City, and its extension would not in the highest degree provide for our wants; but yet it is the only establishment for the purpose that the board can in its judgment point to as entitled to consideration, with the view to enlargement and modification, to supply the place of a new grand arsenal of construction.

In the event, however, of its contemplated enlargement, the board recommends that the Springfield Armory, in addition to its present uses and the manufacture of small-arm ammunition, have also transferred to it the manufacture of that class of leather-work contemplated in the first plan to be fabricated at Frankford Arsenal.

This arrangement, as no other changes in the first plan proposed by the board are deemed advantageous, would leave, after the disposition of the arsenals heretofore recommended to be sold, the ordnance duties of the country to be performed at the following arsenals and armories, viz:

First. Frankford Arsenal, Springfield Armory—arsenal and armory of construction.

Second. Fort Monroe Arsenal, Augusta Arsenal—arsenals for storage, issue, and repair.

Third. Kennebec Arsenal, New York Arsenal, and Indianapolis Arsenal—arsenals for storage and issue.

In concluding this part of the report, the board feels called upon to state that this second plan, in its judgment, offers no considerable advantages even on the score of economy, and, therefore, it feels constrained not to recommend its adoption unless it is impracticable to carry out the first plan or its equivalent.

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The accompanying maps, marked from 4 to 17, show the extent of the grounds and location of the buildings at our present arsenals east of the Mississippi; the geographical positions of the arsenals and their rail and water communications are shown on map No. 24.

POWDER-DEPOT SITES.

The essential requisites for a powder-depot site are fully set forth in the instructions of the Chief of Ordnance to the board convened at New York City, dated October 6, 1866, to wit:

"In selecting sites for these two depots, the following considerations must be observed:

"1st. The depots should be in a region of country which does not admit of being densely populated, so that the destruction of life and property by accidental explosions would be as small as possible.

"2d. They should be of sufficient extent to contain in suitable positions magazines to store not less than 10,000 tons of powder for the depot near New York, and not less than 6,000 tons for the other depot.

"3d. They should be near to a principal, railroad, that they may be readily connected with it by a railroad belonging to the Government, and at a point where transportation can be had with facility at all seasons to all points on the seaboard, to the interior, and to the lake frontier."

The board, although deeming it of the first importance that the powder-depot should be established near the contemplated grand arsenal of construction, yet in its surveys due attention was paid to important local particulars.

The vicinity of New York, on the line of the Erie Railroad, it was known from the surveys of the board of 1866, could not only furnish sites in every way desirable for the proposed depot, but the best attainable in the country.

The board made not only the surveys made by the board of 1866, but also additional ones.

The special particulars of the sites selected to choose from are given in the accompanying maps marked from — to —, and their relative position to the proposed grand arsenal are given in the accompanying map marked —.

Regarding this subject, the board (concurring in the opinion and facts therein set forth) quote the following from the report of the board of 1866:

"The location of a site for the depot to be established in the vicinity of New York City was deemed to be the first subject for consideration, and preliminary examinations of the most approved local maps—containing in minute detail the topographical features of the surrounding country and the different converging lines of railroad to New York—were made and detailed inquiries instituted among parties possessing accurate and special knowledge of the characters of *special localities*.

"A combination of immediate water and railroad facilities for transportation was regarded as a desideratum, but this condition, it was found, could not be fulfilled near New York, without sacrificing the more important requirements of a site as set forth in the instructions of the Department.

"The results of the preliminary inquiries and examinations of the board pointed decidedly and clearly to the valley of the Ramapo River, between the town of Sufferns, N. Y., and Turner's Station, N. Y., along the line of the Erie Railroad, and distant from New York from thirty-two to fifty miles, as the only general locality which had all the prime requisites, and would in all probability furnish the desired site, (see map No. 18.) A *detailed examination* on the part of the board of this tract of country—extending from Sufferns to Turner's—was made. The general topographical features of this part of the Ramapo Valley were found to be hills on either side varying from 100 to 500 feet in height (the terminating slopes of the Taconic range) skirting the narrow bottom-lands on which the Erie Railroad is located, and here and there broken by narrow ravines diverging at different angles from the valley, and at intervals interrupted by broader ones, on some of which are located the small villages of Ramapo and Sloatsburgh and the hamlet of Southfields. In rear of these heights the country is broken by narrow ravines parallel to the valley and walled in by the opposite hills.

"These superior natural features for our purposes, with the absence of inhabitants and of arable grounds for cultivation and support of a dense population, determined the question as far as general location was concerned, and the special examinations made led to the selection of a tract which, it is believed, will afford an excellent site, and one which we can specially recommend as having every requisite that could be desired, leaving out the advantages of immediate water-transportation. (See map No 18.) This site is known as the Augusta tract, situated in Orange and Rockland Counties, New York, and owned by Peter Lorillard, esq., of New York City. It is thirty-eight miles from New York, has an area of 4,481 acres, and is traversed by the Erie Railroad along the valley of the Ramapo. (See map No. 1.)

"That portion of the property west of the Erie Railroad, bounded on the east by the

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line extending from intersection of the northern line with the railroad southward through 'Fox Hill,' 'High Peak,' and 'Ant Ridge,' and bounded on the west by the property of Mead and Shuet, and on the south and north by the 'Sterling estate,' has been selected (an area of about 2,500 acres) as the best adapted to our purposes. (See map No. 1.) This portion of the tract is approached by the wood-road intersecting the 'Orange turnpike' at the 'saw-works,' and leading through a narrow valley to the 'fish-house,' and extending thence along the east shore of Truxedo Lake. A high hill, around the base of which the road winds, guards this approach at the 'saw-works.'

"The line of hills skirting the valley of the Ramapo, of which 'Fox Hill,' 'Ant Ridge,' 'High Peak,' and 'Iron Mine' are prominent points, and the range bordering on Truxedo Lake and its outlets on the west, form, it will be seen, material barriers on the exterior; and as the intervening or interior ground is broken by ravines, and affords natural traverses between which to locate magazines, we have thus all the natural advantages which could possibly be desired.

"As the fall from Truxedo Lake, along the valley of the outlet, is only 80 feet to the saw-works, it will be seen that a railroad to connect with the Erie Railroad at this point can be readily constructed, and thus connect the site with the interior by rail, and with New York City direct by rail, or, via Piermont, by rail or rail and water. The nearest hamlet to this property is Southfields, a wood and water station of the Erie Road, four miles off; the nearest village is Sloatsburgh, two miles below. (See Map No. 1.) The ground is rocky, and this, combined with its hilly nature, renders it unsuited for agricultural purposes. for residences, or for manufacturing settlements."

The Augusta tract, however, from the present views of the owners, (see letters of Mr. Lorrillard, marked B' and K",) may be too costly to enable the Government to secure it, and the board extended its examination, and selected and had surveyed. as next best and available for the purpose, the sites shown in detail in the accompanying maps, alluded to heretofore.

These sites * * * in the general features of seclusion, character of ground—inclosed by their hilly barriers—ease of connection with the Erie Road, and other essentials approach the perfection of the Augusta tract sufficiently near to render them available for our purpose, provided the former cannot be secured at a reasonable price. In any event the board deem, from the results of its general surveys, that the securement of a suitable site in this section is a foregone conclusion.

* * * * * * *

In concluding this part of the report, it is deemed well to allude to the immediate necessities of a suitable powder-depot for the Atlantic coast.

In the establishment of our present arsenals, as their locations, at the time of their construction, were but sparsely settled, the erection of powder-magazines on these Government reservations provided for our wants in this respect. The rapid increase of population in the adjacent towns and cities has, however, in the majority of cases, rendered these magazines dangerous to the communities in which they are located, and hence the government either has abandoned, or eventually will have to essentially abandon, the storage of powder at all of our arsenals. The damp sea-air renders our fortifications unfitted for this purpose, and the Government has now large quantities of powder rapidly deterioriating at these places for want of proper storage-facilities. About 2,500 tons of powder and 3,000 tons of niter are now on hand.

The necessity of immediate action is hence deemed, it is believed, apparent, and it is earnestly recommended that Congress be asked at its next session to appropriate a sum adequate to purchase a site, and commence the provision of buildings suitable, not only for the storage of powder, but also for our niter supplies, and the accommodation of suitable machinery and appliances for the manufacture of experimental powders.

EXPERIMENTAL GROUND FOR HEAVY ORDNANCE.

The Department has long felt the want of a suitable site for testing heavy ordnance, obtaining ranges, and solving the various experimental problems connected with the science of gunnery.

The report of the Chief of Ordnance of 1872 thus alludes to the entire inadequacy of our present facilities in this regard:

"It has been compelled to avail itself of the limited extent of ground near Fort Monroe for the prosecution of these important duties. As the artillery school of practice is established on this reservation, the space is necessarily too contracted for the operation of both. Besides, the range obtained on land is but little more than a mile, and that over the waters of the Chesapeake Bay seldom available; whereas, for efficient experimental purposes, a range of at least six miles is indispensable.

"Some central point convenient to railroad communication, with a suitable extent of level ground, could be readily selected and purchased at a small cost. Experiments with large ordnance cannot be properly conducted without the best and most approved facilities, such as every military nation has found it necessary to provide."

The main features that are essential to such a site are that it should be comparatively

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level, easily accessible, not traversed by highways or extensive water-courses, uninhabited, and sufficiently remote from any settlements to avoid any possible accidents, and embracing an extent of land from seven to eight miles in length and from one-half to one mile in width. It is deemed very desirable by the board that this site should not be very remote from the grand arsenal on the Atlantic seaboard, nor from the powder-depot.

The level beaches and flat interior lands of Long Island and the coast of New Jersey were all, it will be seen by the record, examined.

The sites examined on Long Island are in the vicinity of Babylon, Deer Park, Bay Shore, and Islip. The ground lies here in extensive level stretches, adapted in this respect for our purposes, but it is deemed objectionable by the frequency of rail and wagon roads, and by the rapidly-increasing settlements, rendering early and serious interference, in this regard, highly probable.

The Jersey coast, extending from Sandy Hook to and including Squan and Island Beaches, consists of level and long stretches of sandy beaches, and the upper end of Squan Beach, in the vicinity of the town of Point Pleasant and Squan Village, has the best local advantages found and examined by the board. This ground has been carefully surveyed, under the direction of the board, by Mr. H. N. Babcock, (see his report marked M",) and a site selected, (see map marked 21.)

* * * * * * *

The contemplated rail connection would be about two and one-half miles, and its construction would not require any extensive excavation or filling-in, and hence it can be built at a moderate cost.

The relative location of this site to the grand arsenal and the proposed powder-depot is shown on the accompanying map marked No. 1. An examination of this map will show that ample rail facilities connect this section of the country with the country at large. The present United States life-saving and signal stations, located on the beach, it is believed will be advantageous to our use of this ground for experimental purposes, while our occupancy will not interfere with these other branches of the public service. The meteorological phenomena of this portion of the coast, such as the force, direction, and frequency of winds and occurrence of fogs, have not yet been fully determined, but all the information in this regard which the board could obtain is presented in the accompanying reports.

While this site does not possess in the highest degree all the desired requisites, still it is believed to be the best that can be found on the Atlantic coast within a convenient and desirable distance from New York City, the proposed grand arsenal, and the depot for powder.

The purchase of this site, building the proposed railroad, and purchase of right of way, the erection of the necessary buildings and improvement of the ground, it is thought, will not exceed $100,000, and it is earnestly recommended by the board that Congress be urged to make the necessary appropriations at its next session.

The Government reservation at Sandy Hook, (see map marked No. 22,) at the entrance of the harbor of New York, distant eighteen miles from the city, and in close and quick communication with it, has an available extent in length of, say, one to two miles, and in breadth of, say, three-fifths of a mile. Its general features are the same as Squan Beach, but it is entirely too contracted for all our uses; and the Long Branch Railroad limits and materially interferes with its usefulness as an experimental firing-ground. However, it is superior in geographical location and equal in other respects to our present facilities at Fort Monroe, and in the interim of the establishment of the experimental ground at Squan Beach it could be utilized (with the permission of the Engineer Department) as an adjunct with Fort Monroe for carrying on such experiments and proof as it may be fitted for and as may be deemed desirable to have conducted at this point.

S. CRISPIN,
Brt. Col., U. S. A., Major of Ordnance, President.
T. J. TREADWELL,
Major of Ordnance.
T. G. BAYLOR,
Major of Ordnance, Recorder.

NOTE.—The maps and drawings referred to in the foregoing report do not accompany it. They are filed in the Office of the Chief of Ordnance.

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A A.—*Statement of the original cost and the estimated market-value of lands, buildings, and improvements at the herein-named United States arsenals east of the Mississippi River.*

Name of arsenal.	Original cost of lands, buildings, and improvements.			Estimated market-value of lands, &c., as taken from reports of the respective commanding officers.			Remarks.
	Land.	Buildings, &c.	Total original cost of land, buildings, &c.	Land.	Buildings, &c.	Total estimated value of lands, buildings, &c.	
Allegheny Arsenal.....	$19,383 71	$287,645 00	$307,028 71	$900,000 00	* $71,911 25	$971,911 25	The buildings, in the event of the land being sold in lots, would be of but little more value to the purchasers than for their materials, excepting those in the lower yard for railroad and manufacturing purposes, shops, dwellings, and store-houses.
Detroit Arsenal.....	16,000 00	417,160 00	433,160 00	77,000 00	73,000 00	150,000 00	Might possibly bring $175,000.
	Government reservation.	109,950 00	.....	35,000 00	25,000 00	60,000 00	Adjoining lands sell at from $100 to $120 per acre; area of land at this post, 224.82 acres.
	No record of cost on file at the post.	Not given..	.....	11,935 00	34,700 00	46,635 00	The buildings, if sold without the land, would not bring over $5,000 to $7,000.
	118,079 97	619,801 21	737,881 18	.....	881,044 31	881,044 31	A board of assessors appointed by the Secretary of the Interior, in their report, dated March 30, 1872, appraised the lands and buildings at this post at $1,527,850.
Watertown Arsenal....	53,616 13	473,286 63	526,902 76	120,000 00	310,000 00	430,000 00	The amount paid for the purchase of the two first tracts of land is not included in the original cost of the land at this post, as it could not be ascertained from the records of the office; (the area of these two purchases is about 40 acres;) if the sale was forced the buildings would not bring the price named.
† Watervliet Arsenal...	56,769 27	545,620 00	602,389 27	150,000 00	837,234 00	987,234 00	In the event of the land being cut up into lots, some of the buildings would have to be moved from the streets which would run through the grounds; in the letter (extract copy inclosed in letter to board on arsenals, &c., of April 1, 1874, marked D^2, to the Hon. John Coburn, chairman of Military Committee House of Representatives, (Col. P. V. Hagner states that he estimates that the reservation, laid out into lots 120 feet by 50 feet, should be worth about $400,000, excluding buildings.

* This value, being 25 per cent. of the original cost, is placed by the board on arsenals, &c.

† The original cost of buildings and improvements is not given in many instances, hence the apparent difference between the estimated market-value and the original cost.

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REPORT OF THE CHIEF SIGNAL-OFFICER.

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REPORT

OF

THE CHIEF SIGNAL-OFFICER.

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL-OFFICER,
Washington, D. C., November 1, 1874.

SIR: Instruction in the drills of the Signal Service with arms, in military signaling and telegraphy, meteorology, and the duties of the Signal Service at signal-stations and at stations of observation and report, has continued during the past year at the signal-school of instruction and practice at Fort Whipple, Va.

The regular drills with arms, the forms for parades, and other military duties are strictly observed at the post, to form a body of selected soldiers, fitted by especial instruction for especial duties, but drilled to habits of discipline which permit their action to be, no matter how widely they may be separated, that of a unit. The special drills of the service require as antecedents the practice-drills in use with the Army; the plan for each drill requiring that the soldiers engaged upon it shall be able to protect themselves, their camps, implements, and trains, or stations, if necessary. For in-door instruction the soldiers are in classes under the supervision of suitable commissioned and non-commissioned officers. Instruction in the International code of signals has been added to the course during the year. The regular drills of practice for field-signals, the practice for the International code, the drills of the field telegraph train, the construction-drill for the erection of permanent lines, have been steadily conducted, and with satisfactory results. The schedule of drills and studies now had at the post is in paper 1.

The average force at the post to maintain the school of practice, and from which details are made, as required, to supply the different stations throughout the United States, and for the wants of the different branches of duty now allotted to the service, has been one hundred and forty men. This number will be largely reduced by details for telegraphic-line construction. Four officers have been instructed at the post during the year. Fifty-four private soldiers, applicants for promotion to the grade of sergeant in the Signal Service under the rules, have been under instruction, of whom thirty-eight were examined by the board convened for that purpose and promoted, three were ordered on station as assistants, and two were discharged before completion of the course. Eleven are still under instruction. One hundred enlisted men have been under instruction to be assistants to sergeants on station. Of these, fifty-three have completed the full course and have been ordered to stations; twenty-five were ordered away before completing the course one was dropped from the instruction-rolls for misconduct; three are waiting orders; and eighteen are still under instruction. Papers 2 and 3.

A new building for the purposes of instruction has been completed since the date of the last report. The recitation-rooms are now commo-

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dious. The rooms for telegraphic practice are well supplied with the instruments used with field-telegraphic trains or in the working of permanent telegraphic lines. The battery-room offers facilities for practical instruction in the care of the different galvanic batteries in ordinary use. The telegraphic practice for each class has occupied from three to four hours daily. A station-room, furnished and equipped as are ordinary stations for meteorological observations, is set aside for station-practice, and in this room the soldiers are familiarized with all the forms of station-duty before being detached on service. The facilities for instruction, the good equipment of the trains, the supply of the necessary materials for the different practicings, together with the pernanency of the force now serving, and the superior character of the men which constitute it, have added greatly to the advantages of the post. The instruction of the classes in military signaling, military telegraphy, and meteorology has been under the immediate charge of First Lieut. C. E. Kilbourne, acting signal-officer. The drill with arms, the drills of the telegraphic trains, and the drills in construction for telegraphic purposes, have been conducted by the officers of the post under the immediate superintendency of Bvt. Capt. R. P. Strong, acting signal-officer, the officer in charge.

The character of the buildings at the post has been much improved. The instruction-building, the buildings for the officers-quarters, and that for the protection of the field-telegraphic train, in process of construction at the last annual report, have been completed and are in use. Two buildings for laundresses' quarters have been constructed. A new building for a commissary and quartermaster store-house is in process of construction, and will soon be completed.

By direction of the Quartermaster-General, and after a careful examination of the ground by him, a plan for supplying the post with water was adopted. In pursuance of this there have been erected an engine-house, with a pump capable of raising 2,400 gallons of water per hour, and a reservoir of 10,000 gallons capacity, and elevated 18 feet above the ground. Supply-pipes have been run to the officers' quarters, to the instruction-building, guard-house, wash-rooms in barracks, and to the stables. In carrying out this plan, especial attention has been given to making proper provision against fire. It now requires only a sufficient supply of hose and a suitable reel to render the post comparatively safe from serious injury.

The sanitary condition of the post is good. The hospital continues under the able management of Dr. L. W. Ritchie, acting assistant surgeon, U. S. A.

First Lieut. Richard P. Strong, Acting Signal-Officer, U. S. A., has been in charge of the post since the date of last report; his duties have been faithfully discharged.

The post of Fort Whipple constitutes, as established, the only school of instruction in the United States at which either officer or enlisted man can receive the full tuition and the thorough practice necessary for the proper discharge of the duties of the signal service. All officers and enlisted men of the signal service pass regularly the course of instruction at this post. It is recommended that all officers intended to serve as acting signal-officers and instructors in the different geographical military departments, be here instructed before serving on any detached duty.

The Chief Signal-Officer has dwelt at length in preceding reports upon the benefit to the United States to result from the maintenance of this post and the force of the Signal-Service upon their appropriate duties.

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With the men here instructed the United States has kept up, during the year, the net-work of signal-stations now extending over so great a territory, and has had always ready for service soldiers who give its forces a facility of communication no other country possesses. The construction and management of the military telegraphic lines, now recognized as absolutely necessary for the safety and development of the interior as any other protection the Army can render, already employ every available man who can be spared for that duty from the wider field of the other duties of the service. There have been constructed during the year, by parties of construction detailed from the post, one hundred and ninety-three miles of telegraphic line for the sea-coast service, and involving the laying of four cables, and men of the same force are now employed in the construction and operation of lines in Texas and Arizona, the stations upon which become at once telegraph stations and stations of observation for the Signal-Service.

Recruiting for the Signal-Service has been conducted under the direction of the War Department, that the recruiting officers of the general recruiting service at designated stations should enlist and order to this office such men, they passing the required physical examination, as may be presented to them by the recruiting sergeants of the Signal-Service. Especial care has been taken in enlisting recruits to select only those who have been well recommended for intelligence and sobriety, and who have been able to pass a rigid educational examination. The result has been manifested in the improved conduct of the men and in the decrease of desertions and courts-martial. The corps has been maintained at the full strength authorized by law, with the necessary reserve. While the popularity of the service has been remarkable, its requirements are not always understood by those who apply to be enlisted. The trouble at one time occasioned to the Secretary of War by recruits complaining of the military duties considered by this office essential, has, however, been obviated by the use of the series of circulars and instructions, shown in Papers 6 and 7, hereto annexed, which are so brought to the notice of every applicant for enlistment, the recruiting-sergeant and the recruiting-officer, that misapprehension seems to be impossible. The recruits are divided into classes, those for the "full" and those for the "field signal-service." The first-mentioned are such as are, after examination by the sergeant, considered by him fitted by education and intelligence for the full duties of the Signal-Service, including not only the duties connected with field-signals and telegraphy, but the duties of sergeants at stations of observation. These men are placed on duty at Fort Whipple, Va., as private soldiers of the Signal-Service for at least two months, after which they have the privilege, on their own application, their conduct being good, of appearing before a board of officers as candidates to be placed under the tuition necessary to be assistants to sergeants on stations. Passing this examination the soldier continues the course, still performing his military duties, until such time as he is reported by the instructor competent to be an assistant. He may then be detailed on duty as an assistant to a sergeant on station. After six months' service satisfactorily rendered as such assistant, during which time he recites regularly to the sergeant in charge, and upon a favorable report, he may be ordered to Fort Whipple to be placed under the additional special military instruction given to candidates for the grade of sergeant. This additional instruction lasts about two months. Upon its completion he is ordered before a board of officers convened at this office for final examination on the special subjects of the instruction, and also before an-

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other board convened at Fort Whipple for report on his proficiency in the drill and duties of the Signal-Service, with and without arms, and his understanding of the military duties and responsibilities of sergeants in the Signal-Service, this examination embracing the more essential of the Articles of War, Army regulations, and customs of the service applicable to the duties of the grade above mentioned. On passing both of these boards, the candidate, as vacancies occur, is promoted to be sergeant in the Signal-Service, but, as a rule, is obliged to serve one month at Fort Whipple before being ordered on station, during which period, in addition to his other duties, he takes, under the direction of the instructor, such observations and makes such records and reports as may keep him familiar with the duties of an observer.

Applicants who, in the judgment of the recruiting sergeants, are not fitted by education and intelligence for the full duties of the Signal-Service, but who are of such ability and character as to render them qualified for its field duties, *i. e.*, those of field-signals and telegraphy, as distinguished from those including the duties of signal-sergeants, may be presented to the recruiting-officer for enlistment for "field-signal service." The recruits so enlisted are not precluded from eventual advancement to the full duties of the Signal-Service and promotion, in case they prove fit and worthy.

A division is also made, after enlistment among the private soldiers, by which those of good conduct, who pass specified examinations in elementary education, military signaling and telegraphy, and the duties and drill (with and without arms) of soldiers of the Signal-Service, are announced as privates of the first class, and wear the special designation in uniform provided.

The systematic course by which the enlisted men are selected, drilled, examined, instructed, tested by practice, instructed in higher branches, again examined and again tested before being intrusted with the management of stations, has thrown much labor upon the several boards of examination. The preliminary board for the examination of applicants to be placed under the first course of instruction, has held a session at this office on every Thursday during the year, and has examined (including re examinations) one hundred and sixty-eight applicants, of whom ninety-five have passed.

The board convened at this office for the examination of candidates for promotion to the grade of sergeant meets, from time to time, as the instructor at Fort Whipple reports candidates ready for examination, and has examined during the year fifty-two candidates, of whom all but two have passed and been promoted.

A board convened at Fort Whipple further examines the candidates for sergeantcies in the general duties of soldiers and non-commissioned officers, and the special drill of the Signal-Service.

The morning report of Fort Whipple for September 30 includes sixteen non-commissioned officers and one hundred and thirty-one privates as present. Of these, seven non-commissioned officers and thirty-seven privates are under special instruction.

The act approved June 16, 1874, required the service to be maintained at its organization of one hundred and fifty sergeants, thirty corporals, to be selected from the privates, and privates, in the proportion of two to each sergeant. This force, with the necessary reserve to fill vacancies as they occur, has been maintained. This legislation has been productive of the best results.

The instruction in the duties of the Signal-Service elsewhere than at Fort Whipple has been as follows:

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One of the officers at the Military Academy at West Point is designated as instructor in military signaling and telegraphy, in addition to other duties, but no reports have been received from him showing the amount of time devoted to this duty or the progress made by the cadets.

Second Lieut. Philip Reade, Third United States Infantry, remained on duty as Acting Signal-Officer of the Department of Missouri until relieved by orders from the General of the Army, August 27, 1874, in order that he might accompany his regiment, which had been ordered from the Department.

The course of instruction in this department has been limited to a knowledge of the use of the day and night signals. One hundred and forty-seven officers and four hundred and forty enlisted men have been instructed during the year. Of this number, fifty-six officers and one hundred and twenty-six enlisted men are reported as proficient in the use of the general service code, as taught in the field.

Instruction has been given at eighteen posts in the department, and each company commander, on taking the field, is required, by department orders, to take with him at least one general-service kit and two telescopes or marine glasses. Thorough instruction, even in the field course, has been rendered difficult, owing to the numerous changes in stations of troops and the various other duties required of them. In relieving Lieutenant Reade, the department commander pays a high compliment to his energy and zeal.

Officers have been designated by two other department commanders to act as instructors in signaling, but their reports exhibit no satisfactory results. Neither of the officers detailed has any practical knowledge of the duty. The rule should be invariable, that all officers detailed as instructors in any branch of the Signal-Service, should be themselves first instructed at the established post of instruction.

The work done at this Office has become extensive, covering a wide field of operation, with many and complicated details, each requiring to be carefully elaborated for each day, and each limited for its discharge to fixed and very brief periods of time. The steadily-improving organization of the service, with the system of regulations adopted, has permitted each branch of duty to be carried on with regularity.

The correspondence of the Office, in its several divisions, is of large amount. Fifty-two thousand three hundred and ninety-six letters have been sent, and four hundred and seventy-seven thousand five hundred and sixty-two received during the year, the record of which is classified in paper 4. The aggregate of the correspondence is five hundred and twenty-nine thousand nine hundred and fifty-eight letters and documents sent and received, exclusive of publications and telegrams.

The numerous requests for information on every subject, many of them only indirectly connected with the duties of this Office, require of themselves much attention.

The Office is in communication with many foreign correspondents, having now official relation with scientists and the chiefs of the meterological services of nearly every prominent power in the northern hemisphere.

Bvt. Lieut. Col. Garrick Mallery, acting signal-officer and assistant, has remained during the year in charge of records, general correspondence and orders, with the superintendence of enlistments and other duties especially assigned to him. The various duties in his care have been well rendered.

The amount of work in the property division of the Office has largely in-

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creased during the year. First Lieut. Henry Jackson, acting signal-officer and property and disbursing officer, has remained in charge. In addition to these duties, Lieutenant Jackson, as in charge of the map-room, has supervised the preparation of two hundred and two maps and charts, and continued the collection of statistics for obtaining the accurate elevations of the several stations of observation. Lines of levels for the purpose have been received by him as follows: From railroad engineers, twenty-two; from Professor Hayden's survey, six; from miscellaneous sources, twelve; making a total of forty. The thanks of the Office are extended to the parties furnishing the information.

One hundred and sixty dollars and eighty-four cents have been received, during the year, from the sale of maps and other publications, in accordance with the act of Congress of March 3, 1874, authorizing such sale.

Three hundred and seventeen meteorological instruments have been purchased since last report, and three hundred and twenty-seven issued.

The average cost of maintaining and working a station of observation during the past year has been $516.56. This amount is exclusive of the cost of telegraphing reports.

The library of the Office has been increased to three thousand two hundred and fifty-five bound volumes, and has upon its files many pamphlets and valuable maps and charts. The works are selected wholly with reference to their value to the scientific branches connected with the duties imposed upon the Office. Many of them have been obtained without expense to the United States through the system of exchanges established. Paper 5 exhibits a list of contributions to the library thus had.

Bvt. Capt. H. W. Howgate, acting signal-officer and assistant, has continued to have general charge of instruction and general supervision of sergeants and assistants, and of the receipt, record, and publication of the weather-reports, which duties, together with others specially assigned him, have been performed with ability. The following is the record of stations reported by this officer:

ALBANY, N. Y.

[*Official number*, 16.]

Latitude	42° 40′
Longitude	73° 45′
Elevation of barometer above sea-level	174 feet.

The station was established by Sergt. Frederick Meyer in December, 1873, and reports began on the 22d of that month, and have been continued regularly. The offices were at first located in the observatory building, and the one used as a machine-shop—the meteorological instruments being in the former and the printing-press in the latter. A new building was put up during the summer, by the trustees of the observatory, for the Signal-Service, into which the instruments have been removed, and which is also occupied by the men as quarters. Sergeant Meyer was in charge until transferred to the central office, June 17, 1874, and succeeded by Sergt. Alois Donhauser, who still remains. There are six assistants at present on duty, two of whom are printers and one a telegraph-operator. The care of the observatory and astronomical instruments occupies the entire time of one man, under the supervision of the sergeant in charge. Lieut. W. B. Weir, acting signal-officer, was in charge of the station for a few weeks during the summer,

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at a time when extensive repairs were required and important local changes being made. In addition to this force Private Forman was sent from the central office, and remained from July 10 to August 31, to repair several of the delicate instruments and get all in good running order, a task for which he was well fitted from long experience in the observatory. In addition to the usual meteorological work of a station, a certain amount of astronomical work is done here in making observations for time, and in furnishing standard time to various corporations and individuals by telegraph. Farmers' bulletins have been issued regularly since January 1, 1874, to 257 post-offices, and the usual publication of tri-daily reports made in the daily newspapers and in the form of bulletins. All reports passing over the New York and Milwaukee circuit are received here. The station was inspected in July, and found in excellent condition so far as the regular station-work was concerned. Both Sergeant Meyer and Sergeant Donhauser have displayed marked intelligence and ability in the discharge of their complicated duties, and they have been fortunate in their assistants. Two men only have been relieved for misconduct, and one transferred to the central office. The following extract is given from the last semi-annual report of the sergeant: "Several State officials, who own large farms, have frequently expressed themselves that they entirely depend upon the Signal-Service report in spring when planting and in fall when harvesting. Observations are made every clear night in observing the transit of two stars, one zenith and one equatorial, over the wires of the meridian circle, and recording the times of these transits by means of a printing chronograph which is set to run with a sidereal clock. The times of transit so recorded are reduced to the mean of the wires, corrected for level and collimation errors, and then employed for finding the azimuth errors, and after correction for azimuth is made, the error and rate of the sidereal clock are determined. The sidereal clock is compared by means of the printing chronograph with the mean-time clock, and the error of the latter clock ascertained. The mean-time clock is constantly kept regulated to correct mean local time, care being taken that the error of the clock will never exceed two seconds of correct mean local time, as found by astronomical observation. Time is transmitted by the mean-time clock itself, which is connected with a repeating-instrument, in such a manner that the latter will close every second during the last two minutes of every hour."

PUBLICATIONS.

Number of farmer's bulletins issued from January 1, 1874, to September 30, 1874	148,841
Number of bulletins issued from January 1, 1874, to September 30, 1874	7,703
Number of press-reports issued from January 1, 1874, to September 30, 1874	112
Number of Form 15 (manifold) issued from January 1, 1874, to September 30, 1874	352
Number of Form 22 (manifold) issued from January 1, 1874, to September 30, 1874	62
Total	157,070

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one standard rain-gauge.

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ALPENA, MICH.

[*Official number*, 85.]

Latitude	45° 05
Longitude	83° 28′
Mean barometer for year ending September 30, 1874	30. 011
Mean temperature for year ending September 30, 1874	40°.9
Amount of rain-fall for year ending September 30, 1874	28.01 inches.

The office is at the corner of Fletcher and Dock streets, as at date of last report. The location is not a good one, and will be changed as soon as a suitable room can be procured. Sergt. F. P. Bayes was in charge until July 15, 1874, when he was transferred to another station, and succeeded by Sergt. T. S. Collins, who still remains. Both men have made all reports satisfactorily. Telegraphic reports have been frequently delayed by interruptions on the line, which passes through an unsettled country for a considerable part of its length. One assistant is on duty, and is favorably mentioned by the sergeant for his good conduct. The station was inspected in August, and found in good condition. Fifteen cautionary signals have been displayed, all of which are reported as justified at the station. Of storm of October 17 and 18, 1873, the sergeant remarks: "Steamer George L. Dunlap left this port before signal was hoisted, but was obliged to put back, and with the steamer W. R. Clinton, remained in port all the 17th. No sailing craft left port." And of storm of November 11, 12, and 13, 1873: "Steamers remained in during display of signals." Of storm of December 1 and 2, 1873: "Steamers delayed going out on account of signals;" and of storm of September 9, 1874: "Steamer John Sherman left port at 8 a. m. for Bay City, but had to return."

The inspector reports that the business men say the cautionary signals are of great service to them. Reports from other stations are not received here.

INSTRUMENTS ON STATION.

Two standard barometers, three standard thermometers, one standard water thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one standard self-register for anemometer, one standard rain-gauge, one standard wind-vane.

ATLANTIC CITY, N. J.

[*Official number*, 116.]

Latitude	39° 22′
Longitude	74° 25′
Elevation of barometer above sea-level	23 feet.

This station was established December 10, 1873, by Sergt. Wm. Slater, who stills remains in charge, and has given full satisfaction by the manner in which he has performed his duties.

The office is located in the first of the life-saving stations at the north end of the town, and within 100 yards of the light-house.

The instrument shelter is of the standard portable pattern, and is placed at the north end of the building, and raised one foot from the ground. The anemometer, wind-vane, and rain-gauge are on the building, and well exposed. The station is supplied with a complete outfit

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for using International signals, and the sergeant on duty is properly instructed in their use. Reports are sent regularly to Philadelphia, where they are put upon the signal wire and transmitted to the central office.

The station was inspected in March, 1874, and found in excellent condition. It is proposed to connect the office with the other stations on the New Jersey coast by telegraph during the present year, and material for this purpose has already been purchased, and a working party sent out to construct the line.

Twenty cautionary signals have been displayed, of which number eighteen are reported as fully verified at the station.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one small wind-vane, one standard rain-gauge.

AUGUSTA, GA.

[*Official number*, 23.]

Latitude	33° 28′
Longitude	81° 54′
Mean barometer for year ending September 30, 1874	30.101
Mean temperature for year ending September 30, 1874	64° 1′
Amount of rain-fall for year ending September 30, 1874	59.79 inches.

No change has been made in the location of the office. Sergt. N. D. Lane continued in charge of station until June 8, 1874, when he was transferred to another station on account of his health, and succeeded by Sergt. H. Bessant, who had been on duty as assistant from March 6, 1874. There are three assistants on duty, one of them being a printer charged with the issue of farmer's bulletins. One assistant was transferred to a northern station in July, 1874, on account of failing health. Sixty-seven post-offices are supplied with two copies of the bulletin daily, except Sundays. The station was inspected in December, 1873, and found in fair condition. Proper instructions were issued to bring it up to the standard, which it is believed have been carried out, as all reports since that date have been received regularly and in satisfactory form.

PUBLICATIONS.

Number of farmer's bulletins issued during year ending September 30, 1874	45,554
Number of maps issued during year ending September 30, 1874	1,231
Number of bulletins issued during year ending September 30, 1874	1,934
Number of p. m. press-reports issued during year ending September 30, 1874	610
Number of Form 22 issued during year ending September 30, 1874	38
Total	49,367

INSTRUMENTS ON STATION.

Two standard barometers, three standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

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BALTIMORE, MD.

[*Official number*, 18.]

Latitude	39° 18′
Longitude	76° 38′
Mean barometer for year ending September 30, 1874	30.062
Mean temperature for year ending September 30, 1874	54° 3
Amount of rain-fall for year ending September 30, 1874	40.32 inches.

The office remains at the corner of South and Water streets, the only change made during the year being the addition of an adjoining room, for the free use of which the service is indebted to the courtesy of the owners of the building. Sergt. H. J. Penrod was in charge until September 12, 1874, when he was discharged the service upon his own request, to accept a civil position of trust. He was succeeded by Sergt. W. T. Boyd. Three assistants have been relieved during the year for misconduct, one deserted, one was called in for discharge, and one transferred to another station. There are three assistants now on duty, of whom two are sergeants, recently promoted. The station was formally inspected in January, 1874, and informally on several other dates during the year, and always found in excellent condition. Sergeant Penrod attended to his office-duties closely, and all reports were made with promptness and regularity. The office is connected by wire with the central office, and one of the assistants is kept on duty as an operator.

Thirteen cautionary signals have been displayed, of which six are reported as fully verified, and one as partly verified at the station. Signals are duplicated on Federal Hill, by Mr. M. L. Dudley, at the Marine Observatory, whence they are visible over a much greater portion of the harbor than from the office-roof. The following extracts are given from Sergeant Penrod's report for the past six months: "Twice during the half year the observer was summoned before the civil courts to testify as to the weather on particular days at this station. The court of common pleas in the first case ruled the record not evidence, on account of its not being the original record; and second, because the observer could not swear positively from his own personal knowledge that it snowed heavily (as the record shows) on a certain day a year or more passed. In the second case, superior court, there being no objection made, the record was admitted as evidence.

"A prominent lawyer here at the next meeting of the legislature will endeavor to have an act of assembly passed making the Signal-Service records evidence before the courts. Several times during the six months has the observer been called on to state the condition of the weather on particular days, in order to settle difficulties and disputes in regard to the shipping and handling of grain at Baltimore during rainy, snowy, foggy, or of misty weather. The western merchants sometimes complain of the delay here in transferring their grain at the great elevators. The commission merchants fall back on our record to show the state and condition of the weather, and that satisfies the western owners. The railroad officials use our statement as to the time of commencement and ending of rain in keeping the hours of work of their employés.

"The 1 a. m. probabilities and synopsis are published by all the morning papers, Sun, American, Gazette, Wecker, and Correspondent. The afternoon paper (News) publishes the 10 a. m. probabilities only for this section of country as received through the Franklin Telegraph Company.

"The same gratifying interest is manifested by the people in regard to the probabilities as at date of my last report. Even the dry-goods

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merchants are governed by them in exposing their goods before their store doors. When the least mistake is made in the probabilities it is heard from most every person on the street, and this is the best evidence of their being consulted. Fifty weather-maps are sent here for distribution daily, from the central office, and conspicuously posted in the leading public offices and places of business. They reach here by two o'clock each afternoon, and are promptly distributed."

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	5,583
Number of Form 22 issued during the year ending September 30, 1874	152
Number of Form 15 issued during the year ending September 30, 1874	48
Number of press-reports issued during the year ending September 30, 1874	1,585
Total	7,368

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one double self-register for anemometer and anemoscope, one standard wind-vane, one standard rain-gauge.

BANGOR, ME.

[*Official number*, 111.]

This station was established for the distribution of farmers' bulletins, and 86,414 copies have been issued to 158 post-offices since it was opened.

The first bulletin was issued November 6, 1873. Private Harry Barton was in charge until February 7, 1874, when he was relieved by Sergt. John T. Downes, who still remains, and has given satisfaction. There is one assistant on duty to insure the prompt issue of the bulletins.

The average time of receiving the synopsis and probabilities is 2.15 a. m., and the average time of mailing 4.30 a. m. The office is located at No. 12 Main street, on the second floor, and in close proximity to the telegraph and post offices. The station was inspected in March, 1874, and found in good condition. The inspector reports that a lively interest is taken in the service by the citizens of Bangor, and that the commercial men are anxious to have cautionary signals displayed there, and also at the mouth of the Penobscot.

BARNEGAT, N. J.

[*Official number*, 115.]

Latitude	39° 48′
Longitude	74° 09′
Elevation of barometer above sea-level	21 feet.

The station was established December 10, 1873, by Sergt. A. M. Geissenger, and the office is located in the second floor of Life-Saving Station No. 16, which is one mile north of Barnegat Inlet and two miles north of the light-house. The nearest post-office is at Forked River, through which all mail for the station is forwarded. The instrument-shelter is of the standard portable pattern adopted for the Signal-Service, and is fastened to the northern end of the building and about one foot above the ground. The anemometer is placed on a post 100 yards east of the

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building on a sand-hill, and the rain-gauge is ten feet south of the anemometer. All of the instruments are well exposed. Sergeant Geissenger was relieved for misconduct May 1, 1874, and succeeded by Sergt. Frank Mangels, who was also relieved for misconduct August 8, 1874. Sergt. E. D. Holbrook is now in charge and doing fairly. An assistant is furnished the station during the summer months, when the crew of the life-service are not on duty. Private A. S. Embree, first assigned in this capacity, deserted July 6, 1874, and was succeeded by Private Eugene Peters, who still remains. Both men on station are telegraph operators, and the office is connected by telegraph with the central office, and reports sent regularly over the whole circuit. Special reports of shipping disasters and of vessels passing the station are made daily. The men are proficient in the use of the International signal code, and provided with the necessary apparatus for communicating with passing vessels when required. The station was inspected in March, 1874, and found in good condition. Nine cautionary signals have been displayed, of which eight are reported as verified at the station.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard maximum thermometer, two standard minimum thermometers, one standard hygrometer, one standard anemometer, one standard rain-gauge, one small wind-vane.

BISMARCK, DAKOTA TERRITORY.

[*Official number*, 104.]

Latitude	46° 48′
Longitude	100° 38′
Elevation of barometer above sea-level	1,677 feet.

The station was established by Sergt. J. H. Smith, and began reporting September 15, 1874. The office is located on Main street, above Third, and contains two rooms, with one window in each.

The exposure for roof instruments is good, and the shelter for the other instruments is of the standard pattern.

The station has not been inspected.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one small wind-vane, one standard rain-gauge.

BOSTON, MASS.

[*Official number*, 13.]

Latitude	42° 21′
Longitude	71° 04′
Mean barometer for year ending September 30, 1874	30.014
Mean temperature for year ending September 30, 1874	48° 2
Amount of rain-fall for year ending September 30, 1874	56.47 inches.

The office remains at 103 Court street, as at last report. Sergt. Powell G. Dietz remained in charge until March 2, 1874, when he was relieved

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for misconduct and ordered to Fort Whipple, Va., but deserted before reaching that post. He was succeeded by Sergt. D. C. Ralston, who still remains and gives satisfaction. Four assistants are on duty, one of whom is a sergeant and two of them printers, charged with the issue of farmers' bulletins, with which 682 post-offices are supplied daily, (except Sundays.) Four men have been relieved during the year for misconduct, one transferred to the central office, and one called in for promotion. The men now on duty are reported upon favorably by the sergeant in charge. The station was inspected in February, 1874, and found in as good condition as the office facilities would permit. The citizens are desirous of having the office removed to the new post-office building when completed, and it is recommended that steps be taken to have the change made, as the present location is a bad one. Twenty-five cautionary signals have been displayed, of which fourteen are reported as fully verified, and one as partly verified, at the station. Of the storm of November 17 and 18, 1873, the sergeant remarks: "The shipping remained in port fully prepared for the storm. Disasters are reported as having occurred on the coast, among which is the schooner Robt. Raikes, ashore on Nahant, and all on board lost. No damage done in the city, but in the adjacent country the gale was very destructive. The signals are duplicated from the roof of a grain-elevator in East Boston, whence they are visible from the greater part of the harbor." The sergeant reports as follows in reference to the interest manifested in the service: "The farmers' bulletins proved to be of inestimable value to the community in general; hardly a day passes by but that several gentlemen from nearly every part of the New England States call at this office, and not only express their great admiration for the correctness of the forecasts, but also their gratitude for the benefit they derive from their publication. The interest of the public in general for the operations of the Signal-Service in this place manifests itself daily in the most gratifying manner. Chemists, lawyers, physicians, scientific men, and men of all vocations can be found daily in the office."

PUBLICATIONS.

Number of farmer's bulletins issued during the year ending September 30, 1874.	292,428
Number of maps issued during the year ending September 30, 1874	9,572
Number of daily bulletins issued during the year ending September 30, 1874.	12,263
Number of press-reports issued during the year ending September 30, 1874	1,978
Number of Form 22 issued during the year ending September 30, 1874	116
Total	312,757

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, two standard minimum thermometers, one standard maximum thermometer, one standard hygrometer, one double selt-register for anemometer and anemoscope, one standard anemometer, one small wind-vane, one standard rain-gauge.

BRECKENRIDGE, MINN.

[*Official number*, 82.]

Latitude	46° 11′
Longitude	96° 17′
Mean barometer for the year ending September 30, 1874	29.981
Temperature for the year ending September 30, 1874	37° 2
Amount of rain-fall for the year ending September 30, 1874	28.06 inches.

The location of office remains unchanged since last report.

The building is a very poor one, but a better one cannot be pro-

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cured for the authorized rent, although there are many suitable buildings unoccupied.

The owners of buildings appear unwilling to rent to the Government at fair rates. In view of this fact the removal of the station to Fargo, on the Northern Pacific Railroad, is recommended. Sergt. C. A. Shaw was transferred to another station, October 2, 1873, and succeeded by Sergt. Newton Phelps, who was called in for discharge, May 22, 1874, and succeeded by Sergt. Herrman Frey, who still remains. All mail-reports have been forwarded regularly and in satisfactory form. The telegraphic reports are occasionally delayed by interruptions on the line.

There is no assistant at the station, nor is one needed.

INSTRUMENTS ON STATION.

One standard barometer, two standard thermometers, two standard minimum thermometers, two standard maximum thermometers, one standard hygrometer, two anemometers, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

BUFFALO, N. Y.

[*Official number*, 33.]

Latitude	42° 53′
Longitude	78° 55′
Mean barometer for year ending September 30, 1874	30°.001
Mean temperature for year ending September 30, 1874	45°.7
Amount of rain-fall for year ending September 30, 1874	39.37 inches.

No change has been made in the location of the office since the date of last report. Sergt. W. H. Colesberry was relieved November 20, 1873, and succeeded by Sergt. James Mitchell, who continues in charge, and has displayed marked zeal and intelligence in the performance of his duties. Six assistants are on duty here at present, but one is assigned temporarily and will be relieved as soon as his services are required elsewhere. Two of the assistants are printers, and have charge of the issue of farmers' bulletins, which are furnished daily, except Sundays, to 257 post-offices. One assistant has been called in for promotion during the year, and two for misconduct.

The station was inspected in July, 1874, and found in excellent condition.

Twenty-six cautionary signals have been displayed, of which number thirteen are reported fully verified, and four partly verified at the station.

Of the storm of October 28 and 29, 1873, the sergeant remarks: "Two propellers and one schooner left port while the signal was flying, but were obliged to return;" and of storm of October 30 and 31, and November 1, 1873: "The schooner Ellington left this port while signal was displayed, and being unable to withstand the gale, she put back, and while trying to reach this harbor was dashed to pieces on the breakwater;" and of storm of December 4 and 5, 1873: "The most severe storm at this point since 1844, excepting gale of 1865. Wires of various telegraph companies blown down. Water unusually high at this end of the lake. Breakwater at entrance of harbor damaged to extent of several thousand dollars by lashing of waves."

Signals are duplicated under the direction of the sergeant by Capt. C. P. Dorr, on the roof of a building which is visible from a greater part of the harbor. The sergeant reports that the members of the meteoro-

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logical committee have manifested unusual interest in the service, and have been collecting data from the signal-reports for the purpose of comparing the climate of Buffalo with that of other cities throughout the country. He also reports that few captains of vessels will leave port while the cautionary signal is displayed.

All reports passing over the New York and the Milwaukee circuit are received here, and it is the point of transfer for the Canadian reports.

The newspapers give a liberal amount of space to the publication of the regular daily reports, and also of those issued from the central office.

PUBLICATIONS.

Number of farmer's bulletins issued during year ending September 30, 1874	166,684
Number of bulletins issued during year ending September 30, 1874	11,003
Number of maps issued during year ending September 30, 1874	5,952
Number of press-reports issued during year ending September 30, 1874	1,650
Number of local reports issued during year ending September 30, 1874	1,065
Number of Form 15 (manifold) issued during year ending September 30, 1874	331
Number of Form 22 issued during year ending September 30, 1874	65
Total	186,755

INSTRUMENTS ON STATION.

Two standard barometers, three standard thermometers, one standard minimum thermometer, one standard maximum thermomter, one standard water-thermometer, one standard hygrometer, three standard anemometers, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

BURLINGTON, IOWA.

[*Official number*, 122.]

This station was established for the distribution of farmers' bulletins, and is in charge of Priv. E. L. Thompson, a practical printer, who has done good servive in the central office for nearly two years. The first bulletin was issued September 30, 1874, and 157 offices are supplied daily except on Sundays.

The office is located in Union Hall, corner of Main and Valley streets.

BURLINGTON, VT.

[*Official number*, 45.]

Latitude	44° 29′
Longitude	73° 15′
Mean barometer for year ending September 30, 1874	30.002
Mean temperature for year ending September 30, 1874	43° 6
Amount of rain-fall for year ending September 30, 1874	37.75 inches.

The location of office was changed August 1, 1874, from the City Hotel to Fisher's Block, at the southeast corner of Bank and Church streets, where the facilities for exposure of instruments are very much better.

Sergt. George H. Ellery, who was in charge at date of last report, was relieved December 15, 1873, for discharge, and succeeded by Sergt. W. H. Colesberry, who was relieved for misconduct February 9, 1874. Sergt. D. C. Ralston was in charge until March 2, 1874, when he was transferred

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to another station and succeeded by Sergt. W. A. Chapman, who still remains and performs his duties satisfactorily. The station was inspected in October, 1873, and found in good condition.

PUBLICATIONS.

Number of Form 15 (manifold) issued during the year ending September 30, 1874.	169
Number of Form 22 (manifold) issued during the year ending September 30, 1874.	25
Number of press-reports issued during the year ending September 30, 1874.....	391
Total.....	585

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

CAIRO, ILL.

[*Official number*, 53.]

Latitude.....	37° 00′
Longitude.....	89° 12′
Mean barometer for the year ending September 30, 1874.....	30.060
Mean temperature for the year ending September 30, 1874.....	58°.4
Amount of rain-fall for the year ending September 30, 1874	48.06 inches.

The office remains at No. 71 Ohio Levee, and is well located. The instrument-shelter has been described in previous reports, and is one of the best in use on station. Sergt. E. Garland was on duty until January 13, 1874, when he was relieved by Sergt. Edwin Booth, who remained until July 27, 1874, when he was succeeded by Sergt. Thomas Jones. Both Sergeants Garland and Booth were relieved for neglect of duty, and punished by reduction to the ranks. There has been no change of assistant during the year. The station was inspected in January, 1874, and again in September, 1874, and was unfavorably reported upon on both occasions. The present sergeant is doing better than his predecessors, but is still not up to the standard.

Reports from twenty other river stations are received here each afternoon, and published in the usual manner. Fifteen maps are also received daily from Saint Louis, and posted in the principal public places.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874.....	2,347
Number of press-reports issued during the year ending September 30, 1874....	603
Number of local reports issued during the year ending September 30, 1874	72
Number of Form 22 issued during the year ending September 30, 1874	27
Number of Form 26 issued during the year ending September 30, 1874.....	5,963
Total	9,002

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one minimum thermometer, two maximum thermometers, two water-thermometers, one hygrometer, one anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

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CAPE HATTERAS, N. C.

[*Official number*, 123.]

Latitude	35° 14′
Longitude	75° 30′
Elevation of barometer above sea-level	7½ feet.

The station was established August 18, 1874, by Sergt. Geo. Onslow, who remains in charge, with one assistant. Both men are competent telegraph-operators, and in addition to the regular station work have to keep the telegraph-line in repair half way to Cape Henry. The office is located temporarily on the first floor of the building occupied by the assistant light-keeper, and the exposure for instruments is as good as can be obtained with the present facilities. The instrument-shelter is of the standard portable pattern, and here, as at other coast-stations, has been found to work satisfactorily.

Two cautionary signals have been displayed, both of which are reported as verified at the station.

Of the storm of September 28 and 29, 1874, the sergeant remarks: "Wind at 9.20 p. m., of the 28th, blew at the rate of seventy-five miles per hour, carrying off cups of anemometer, which were recovered next morning."

The station is in direct telegraphic communication over the signal-wire with the central office, and reports are sent regularly in the usual form. The station is supplied with a full set of International signal-flags, and the sergeant in charge is fully instructed in their use. The station has not yet been inspected.

INSTRUMENTS ON STATION.

One standard barometer, two standard thermometers, one standard minimum thermometer, one standard hygrometer, one standard anemometer, one small wind-vane, one standard rain-gauge.

CAPE HENRY, VA.

[*Official number*, 118.]

Latitude	36° 56′
Longitude	76° 00′
Elevation of barometer above sea-level	23 feet.

The station was established December 9, 1873, by Sergt. Wm. Stein, who still remains in charge, and has given entire satisfaction by the promptness and regularity with which all his reports have been forwarded.

The office was located in the building occupied by the light-keeper, and has remained there, the only change being its removal, April 20, 1874, to a room on another floor of the same building. Two assistants, both of whom are fair telegraph-operators, are on duty, and have the repair of the line on each side of the station to attend to. One man takes half the distance to Norfolk, and the other, half the distance to Cape Hatteras, when necessary, leaving the sergeant to attend to the regular station duties.

Two other men were assigned temporarily in September, but have been since relieved, as their services were required elsewhere. The

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station is supplied with an International signal outfit, and is in direct communication with the central office, to which regular reports are made daily, and also such special reports of disasters to shipping as may be required.

The instrument-shelter is of the standard portable pattern and is well located. The exposure of all instruments is good. Eighteen cautionary signals have been displayed, of which twelve are reported as verified at the station. The station has not been inspected.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one small wind-vane, one standard rain-gauge.

CAPE MAY, N. J.

[*Official number*, 54.]

Latitude	38° 56′
Longitude	74° 58′
Mean barometer for year ending September 30, 1874	30.057
Mean temperature for year ending September 30, 1874	52°.4
Amount of rain-fall for the year ending September 30, 1874	46.93 inches.

No change has been made in the location of the office during the year, and Sergt. Theodore F. Townsend still remains in charge. All reports, telegraphic and mail, have been rendered promptly and in a satisfactory manner. An assistant was ordered to the station April 9, 1874, and still remains. Thirty-three cautionary signals have been displayed during the year, of which twenty-four are reported by the sergeant as justified at the station and nine not justified. The sergeant reports that while the signal was flying on the 6th, 7th, and 8th of October, 1873, a large fleet of vessels anchored under the shelter of Cape May and remained until it was lowered. The same general interest in the service prevails as at last report, and the office has many visitors from the guests of the several hotels, who desire to obtain information about the weather before starting out on fishing or other pleasure excursions. As no reports are received from other stations, the only publications have been those of local observations furnished to the local press.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard maximum thermometer, one standard minimum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one small wind-vane.

CHARLESTON, S. C.

[*Official number*, 21.]

Latitude	32° 45′
Longitude	79° 55′
Mean barometer for year ending September 30, 1874	30.093
Mean temperature for year ending September 30, 1874	65°.6
Amount of rain-fall for year ending September 30, 1874	67.70 inches.

The office remains at the corner of Bay and Broad streets, and is well located for the display of cautionary signals and for the exposure of in-

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struments. Sergt. M. L. Hearne continues in charge as at date of last report. Two assistants have been called in for promotion during the year, and one for discharge. Two are now on duty. The station was inspected in December, 1873, and found in bad condition. The sergeant was sharply reprimanded, and since that date reports have been rendered satisfactorily. All reports passing over the New York and Savannah circuit have been received here since February 4, 1874, and are read with interest by the cotton merchants and other business men. Six cautionary signals have been displayed, of which number five are reported as justified at the station. In reference to one of these displays the sergeant writes as follows:

"At 3 p. m. of October 6, 1873, the roof of the Northeastern depot blew off, killing one man and mortally wounding several others. Steamer Equator struck on the bar at entrance of harbor and was considerably injured. On the 5th of April last, two vessels and one steamer remained in the harbor, after seeing the signal hoisted, although they were ready to leave at the time. The captains came to the office for information, and decided not to leave while the storm lasted."

PUBLICATIONS.

Number of daily bulletins issued during year ending September 30, 1874	2,950
Number of maps issued during year ending September 30, 1874	1,908
Number of press-reports issued during year ending September 30, 1874	507
Number of Form 22 issued during year ending September 30, 1874	42
Number of Form 15 (manifold) issued during year ending September 30, 1874	320
Total	5,727

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one maximum thermometer, one minimum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

CHEYENNE, W. T.

[*Official number*, 68.]

Latitude	41° 12′
Longitude	104° 42′
Mean barometer for year ending September 30, 1874	29.957
Mean temperature for year ending September 30, 1874	45°.6
Amount of rain-fall for year ending September 30, 1874	8.60 inches.

The office was removed May 20, 1874, to the second floor of the building, on the south side of Seventeenth street, between Dodge and Ransom streets.

The location is a good one, and within easy reach of the telegraph-office and principal business-houses.

Sergt. A. C. Dobbins has been in charge since the station was opened in 1870, and attended to his duty faithfully and well.

There is no assistant now on duty; the one named in last report was transferred May 8th, 1874, to another point where his services were more urgently required.

The station was inspected in August, 1874, and found in good condition.

PUBLICATIONS.

Number of bulletins issued during year ending September 30, 1874	1,481
Number of press-reports issued during year ending September 30, 1874	169
Number of Form 22 issued during year ending September 30, 1874	49
Total	1,699

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INSTRUMENTS ON STATION.

One standard barometer, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standardrain-gauge, one standard wind-vane.

CHICAGO, ILL.

[*Official number*, 37.]

Latitude	41° 52′
Longitude	87° 38′
Mean barometer for year ending September 30, 1874	30.012
Mean temperature, year ending September 30, 1874	49°.5
Amount of rain-fall for the year ending September 30, 1874	31.09 inches.

The location of the office has not been changed since last report, but one small room has been added as necessary for the work of the station.

Serg. W. S. Kaufman remains in charge, and has forwarded all reports regularly and satisfactorily. Six assistants are on duty, and the work cannot be properly done with a less number. Three of the assistants are printers, and have charge of the weather-maps and issue of farmers' bulletins. Seven hundred and thirty-two post-offices are supplied regularly with the latter.

Two assistants have been called in for promotion, one deserted, and two transferred to other stations.

All reports passing over the New York and Milwaukee circuit are received here, and it is also the point of transfer for reports from the West and South, and the amount of work necessarily done is unusually large; the generally correct manner in which Sergeant Kaufman has attended to his duty is worthy of commendation.

The station was inspected in August, 1874, and found in good condition.

Twenty-seven cautionary signals have been displayed, of which fourteen are reported as fully verified and three as partly verified. The signals are duplicated by the sergeant upon the roof of the Central Hotel building, whence they are visible from a greater part of the harbor. Arrangements have been made for the display of signals from the new light-house when it is completed.

PUBLICATIONS.

Number of farmers' bulletins issued during the year ending September 30, 1874	539,187
Number of bulletins issued during the year ending September 30, 1874	7,104
Number of maps issued during the year ending September 30, 1874	27,420
Number of press-reports issued during the year ending September 30, 1874	2,714
Number of Form 22 issued during the year ending September 30, 1874	151
Total	576,576

INSTRUMENTS ON STATION.

Two standard barometers, three standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

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CINCINNATI, OHIO.

[*Official number*, 65.]

Latitude	39° 06′
Longitude	84° 26′
Mean barometer for year ending September 30, 1874	30.071
Mean temperature for year ending September 30, 1874	56°.6
Amount of rain-fall for year ending September 30, 1874	40.07 inches.

The office remains in the same building as at date of last report, and the location cannot well be improved upon. Sergt. Theodore Mosher was transferred to the central office October 2, 1873, and succeeded by Sergt. E. H. Singleton, who remained until discharged at his own request, February 25, 1874. He was succeeded by Sergt. J. O. Manson, who was relieved August 25, 1874, upon the recommendation of the inspecting officer. Sergt. S. S. Bassler has been in charge since that date, and has shown himself to be an energetic, hard-working, intelligent sergeant. Here, as at other large stations, there has been great difficulty in securing good assistants, and numerous changes have consequently been made during the year. Three men have been relieved for misconduct, and five transferred to other stations. Sergt. J. M. Watson was the senior assistant until assigned to the charge of another station, and succeeded in his position by Sergt. Edward Lloyd. The size of the station and the amount of night-work done render it necessary to have a non-commissioned officer constantly on duty.

There are five assistants now on duty, of whom three are printers. Farmers' bulletins are printed and issued regularly to 617 post-offices. Maps are issued daily, and judicously distributed. The station was inspected in December, 1873, and again in September, 1874, and found in good condition on both occasions. The present working force is composed of good, industrious men, fully competent to do their work, but kept constantly employed, and when one is unable, from sickness, to attend to his duty, it is necessary to employ civilian assistance. An additional assistant was recommended by the inspector who last visited the station, and will be furnished when a suitable man can be spared. A full set of meteorological instruments was displayed again this year in the exposition building, and the morning synopsis and probabilities printed there during the exposition, being telegraphed from the central office for that purpose. The following extracts from the report of the sergeant, for the six months ending June 30, 1874, are given to show the use made of the reports: "The river reports have been of unusual interest to our steamboat-men, coal-dealers, and other merchants interested in the river trade. The information they give has, in no few instances, led to important results, and been of great value to the public, and more especially to those directly engaged in the river trade. To know the stages of water in the rivers throughout the country is an aid to business transactions connected with the river, that is of incalculable value. The steamboatmen, as they become more acquainted with our bench-marks, pay more attention to these reports, and make good use of the valuable information they give, and though the stations from which reports are received are not as numerous as desired, yet it is hoped they will gradually be established at every point where the information they give can be made of interest to the public. The weather-reports are of great value to the pork and provision packers of this city, they being governed in a great measure by the favorable indications of the reports. They carefully consult them daily, and also interview the sergeant in charge. The

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medical fraternity also make constant use of the reports, and in some instances regulate their mode of treatment by the changes in the meteorological conditions of the atmosphere. The study of our reports opens to them a field for exploration, one which has already rendered some valuable information, and promises to add more. Searching out and defining the relations existing between atmospheric conditions and contagious diseases are some of the advantages these reports afford the medical profession, while there are others that might be enumerated. The board of health have deemed it of special importance to show the meteorological condition of the atmosphere, in connection with their weekly reports, and have published full local reports regularly, in connection with their weekly mortuary report, the data for which have been furnished from this office."

The daily reports received here are printed in excellent form by the leading daily newspapers, which give a large amount of space to the data furnished from the signal-office, and in many ways manifest a lively and gratifying interest in the service.

PUBLICATIONS.

Number of farmers' bulletins issued during year ending September 30, 1874	445,233
Number of maps issued during year ending September 30, 1874	49,666
Number of bulletins issued during year ending September 30, 1874	12,340
Number of press-reports issued during year ending September 30, 1874	2,230
Number of local reports issued during year ending September 30, 1874	445
Number of Form 15 (manifold) issued during year ending September 30, 1874	3,460
Number of Form 22 issued during year ending September 30, 1874	153
Number of Form 26 issued during year ending September 30, 1874	5,829
Total	519,356

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

CLEVELAND, OHIO.

[*Official number*, 34.]

Latitude	41° 30′
Longitude	81° 47′
Mean barometer for year ending September 30, 1874	29.987
Mean temperature for year ending September 30, 1874	50°.4
Amount of rain-fall for year ending September 30, 1874	38.56 inches.

No change has been made in the location of office, but a new instrument-shelter has been erected on the roof of the office building to secure a better exposure for the instruments. Serg't. Will Stromberger remains in charge, and has performed all his duties in a satisfactory manner. Two assistants have been called in for promotion during the year, one of whom has been promoted to the grade of sergeant, while the other is still under instruction. Two assistants are now on duty, both of whom are favorably mentioned by the sergeant for good conduct. The station was inspected in July, 1874, and found in excellent condition. Twenty-three cautionary signals have been displayed, of which number seventeen are reported as verified at the station. Of the storm of April 5, 6, 9, and 10, 1874, the sergeant remarks: "All the shipping remained in port on seeing the signals." "The signal ordered up on the

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28th of June, 1874, caused general comment all over the city, because it was put up when there was not a cloud visible, and was succeeded early the next morning by a storm of such short duration and so much intensity as to cause wakefulness with more than half our citizens."

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	5,727
Number of maps issued during the year ending September 30, 1874	8,089
Number of press-reports issued during the year ending September 30, 1874	1,137
Number of local forms issued during the year ending September 30, 1874	1,821
Number of Form 15 (manifold) issued during the year ending September 30, 1874	4,617
Number of Form 22 issued during the year ending September 30, 1874	58
Total	21,449

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one double self-register for anemometer and anemoscope, one standard wind-vane, two standard rain-gauges.

COLORADO SPRINGS, COL.

[*Official number*, 109.]

Latitude	38° 55′
Longitude	104° 58′

This station was established originally as a base of supplies for the one on the summit of Pike's Peak, but was furnished with instruments, and eventually made independent of the summit so far as management is concerned. It is connected by the signal telegraph-line with the summit, and is the point of transfer of all messages between that station and points eastward. The office was moved in the latter part of March to a more favorable location in the town, and is now comfortably fitted up.

All supplies for the summit-station are collected here, and sent up under the direction of the sergeant in charge, who is provided with the necessary means of transportation for this purpose. Sergt. D. H. Sackett was in charge, under the direction of the sergeant at the summit-station, until January 29, 1874, when he was transferred to another station, and succeeded by Sergeant Fenton, who still remains, and whose management has been entirely satisfactory.

Speaking of him the inspecting-officer remarks: "Sergeant Fenton has evidently the interests of the service at heart, and has been unremitting in his labors." The station was inspected formally in February, 1874, and informally several times since that date, and has been uniformly found in excellent condition.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one standard rain-gauge, one standard wind-vane.

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CORINNE, UTAH.

[*Official number*, 70.]

Latitude	41° 30′
Longitude	112° 10′

This station was in charge of Sergt. S. W. Beall until broken up, March 14, 1874, and transferred to Salt Lake City.

His reports were forwarded regularly and in satisfactory form.

PUBLICATIONS.

Number of press reports issued from October 1, 1873, to March 14, 1874	49
Number of bulletins issued from October 1, 1873, to March 14, 1874	196
Number of Form 22 issued from October 1, 1873, to March 14, 1874	2
Total	247

CORSICANA, TEX.

[*Official number*, 107.]

Latitude	32° 05′
Longitude	96° 30′
Elevation of barometer above sea-level	447 feet.

This station was established September 1, 1874, by Sergt. W. D. McChesney, who began reporting on the morning of September 15, sending his reports to Galveston, where they are transferred to the central office. The office is located in Molloy's Hotel, on the corner of Harden and Beaton Streets, and within fifty yards of the telegraph-office. The room selected is in the second story, and well lighted. The instrument-shelter is of the standard pattern, and the exposure for roof-instruments is good. There is no assistant at the station, and it has not yet been inspected.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one standard rain-gauge, one small wind-vane.

DAVENPORT, IOWA.

[*Official number*, 51.]

Latitude	41° 32′
Longitude	90° 38′
Mean barometer for year ending September 30, 1874	30.020
Mean temperature for year ending September 30, 1874	49°.5
Amount of rain-fall for year ending September 30, 1874	38.47 inches.

The office remains in the First National Bank building, at the southwest corner of Second and Main streets, and is well located for business purposes. It is not well lighted, as the only window is darkened by the instrument-shelter.

Sergt. S. P. Ruthven continues in charge, and has the same assistant as at date of last report. Both men are favorably mentioned by the officer who inspected the station in April and found it in good condition.

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PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	5,367
Number of Form 26 issued during the year ending September 30, 1874	1,236
Number of Form 22 issued during the year ending September 30, 1874	15
Total	6,618

INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard maximum thermometer, one standard minimum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-guage, one standard wind-vane.

DENVER, COL.

[*Official number*, 76.]

Latitude	39° 44′
Longitude	105°.04
Mean barometer for year ending September 30, 1874	30.004
Mean temperature for year ending September 30, 1874	48°.6
Amount of rain-fall for year ending September 30, 1874	13.99 inches.

The office remains at No. 384 Holladay street, as at date of last report, and is well located. Sergt. Henry Fenton was in charge until transferred to another station January 29, 1874. He was succeeded by Sergt. D. H. Sackett, who was arrested for gross misconduct February 25, 1874, and sent to Cheyenne for confinement. Sergt. P. J. Huneke was at once sent from Washington to succeed him; and the station-work was done by Private J. H. Smith, the assistant at Colorado Springs, until his arrival.

All reports have been made in a satisfactory manner during the year.

The station was inspected in March, 1874, and found in good condition.

The following extracts are given from the reports of the sergeant in charge:

The interest taken by the citizens of Denver in the Signal-Service is general only in so far that most every one has a desire to know the maximum and minimum temperature, the velocity of wind, and the amount of precipitation, and that they place the utmost reliance in the accuracy of the reports of the service.

But there are special classes who utilize the reports, and to whom they are of great value. First among these stand the physicians, not only of Denver but of the whole Territory. At a recent convention of doctors of medicine, held in this city, they organized a committee on climatology, of which Dr. Charles Dennison was elected president. In studying the peculiarities of this climate and its effects upon the human system, they make use of the signal-service reports in connection with the reports of private observers in the different parts of the Territory, and Dr. Dennison assures me that they are very valuable in this respect on account of their reliability.

The people of Denver are naturally in favor of immigration, and among other inducements they hold out to the new-comer the favorable climate of Colorado, referring to the signal-service weather-reports to bear them out in the truth of their statements.

The reports are also used by those interested in irrigation, who state that the knowledge of the amount of rain-fall is of great importance to them.

The average velocity of wind, its pressure, and monthly amount in miles traveled, is used by constructors of wind-mills, which branch of industry is growing daily in this Territory, as the main portion of the land will have to be irrigated by means of wells, whence the water is raised by wind-power.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	1,397
Number of local reports issued during the year ending September 30, 1874	376
Number of Form 22 issued during the year ending September 30, 1874	71
Number of weekly means issued during the year ending September 30, 1874	38
Total	1,882

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INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard maximum thermometer, one standard minimum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

DETROIT, MICH.

[*Official number*, 36.]

Latitude	42° 21′
Longitude	83° 07′
Mean barometer for year ending September 30, 1874	29.996
Mean temperature for year ending September 30, 1874	47°.9
Amount of rain-fall for year ending September 30, 1874	31.31 inches,

No change has been made in the location of the office since the date of last report. Sergt. William Finn continues in charge, and has performed his duties intelligently and satisfactorily. Numerous changes in the assistants have been made during the year. Two have been called in for promotion, three transferred to other stations, and two relieved for misconduct. Four assistants are now on duty, of whom two are printers, and all are favorably mentioned by the sergeant. Two of the assistants are printers, charged with the issue of farmers' bulletins, which are issued daily, except Sundays, to 351 post-offices. The station was inspected in August, 1874, and found in excellent condition. Eighteen cautionary signals have been displayed, of which five are reported as verified at the station. Since July, 1874, these signals have been duplicated, under the direction of the sergeant, by Messrs. Dunlap, Donaldson & Co., on their warehouse, whence they are visible to most of the shipping in the river. Of storm of April 27, 28, and 29, 1874, the sergeant remarks: "Marine reports show that violent winds prevailed on Lakes Huron and Erie. Ten vessels remained in port, weather-bound, and in consequence of signal. The press and lake men are unanimous in acknowledging the great benefit of the warning." The sergeant reports: "The interest in the service has been steadily on the increase, the utmost capabilities of the office being taxed to supply the demand for the reports." All reports passing over the New York and Milwaukee circuit are received here, and selections from them regularly published in the daily newspapers.

PUBLICATIONS.

Number of farmer's bulletins issued during the year ending September 30, 1874	213,331
Number of maps issued during the year ending September 30, 1874	5,218
Number of bulletins issued during the year ending September 30, 1874	9,872
Number of Form 82 issued during the year ending September 30, 1874	71
Total	228,492

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

DODGE CITY, KANS.

[*Official number*, 106.]

Latitude	37° 39′
Longitude	100° 08′
Elevation of barometer above sea-level	2,482 feet.

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The station was established September 1, 1874, by Sergt. M. L. Landers, who began reporting September 15, sending reports to Leavenworth, where they are transferred to the central office.

The office is located in the Dodge House, but a detailed description of it cannot be given as none has yet been received from the sergeant.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one small wind-vane, one standard rain-gauge.

DUBUQUE, IOWA.

[*Official number*, 98.]

Latitude	42° 30′
Longitude	90° 45′
Mean barometer for year ending September 30, 1874	30.021
Mean temperature	48°.6
Amount of rain-fall	28.07 inches.

The office remains at the corner of Main and Sixth streets, and Sergt. R. J. Bell continues in charge. He was sick and unable to perform duty for four days in January and fifteen days in February, 1874, during which time the station-work was performed satisfactorily by Dr. Henry Astel.

Sergeant Bell is a zealous, hard-working man, and has rendered all reports satisfactorily while his health permitted him to do so. Only the afternoon reports are sent by telegraph, being important to river-men in showing the depth of water in the river at that point.

The citizens are desirous of receiving reports from other points on the river. The station was inspected in April, and found in excellent condition.

PUBLICATIONS.

Number of local reports issued during the year ending September 30, 1874	935
Number of Form 22 issued during the year ending September 30, 1874	41
Total	976

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

DULUTH, MINN.

[*Official number*, 40.]

Latitude	46° 48′
Longitude	92° 08′
Mean barometer for year ending September 30, 1874	29.972
Mean temperature for year ending September 30, 1874	39°.4
Amount of rain-fall for year ending September 30, 1874	34.59 inches.

No change has been made in the location of the office since last report, nor has any change been made in the men on duty. Sergt. R. R. Martin,

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in charge, has rendered all reports promptly and satisfactorily, and his assistant is commended for steadiness and attention to duty. Both men are fair telegraph-operators. Twenty-four cautionary signals have been displayed, of which sixteen are reported as verified at the station.

The station was inspected in May, 1874, and found in good condition.

The sergeant reports a gratifying amount of interest manifested in the service by the inhabitants, and calls for meteorological information frequent. Captains of lake-vessels are in the habit of calling at the office before sailing to ascertain the probable character of the weather on the lake.

PUBLICATIONS.

Number of local reports issued during year ending September 30, 1874	731
Number of special reports issued during year ending September 30, 1874	36
Number of Form 22 issued during the year ending September 30, 1874	63
Total	830

INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

EASTPORT, ME.

(*Official number*, 94.)

Latitude	44° 55′
Longitude	66° 54′
Mean barometer for year ending September 30, 1874	29.922
Mean temperature for year ending September 30, 1874	40°.9
Amount of rain-fall for the year ending September 30, 1874	48.83 inches.

No change has been made in the location of the office at this station. Sergt. W. C. W. Shreck was in charge until relieved on account of ill health, October 24, 1873. He was succeeded on that date by Sergt. T. C. Taylor, who still remains. All reports have been rendered regularly and promptly. Private D. C. Murphy has been on duty as assistant during the whole year. Thirty-five cautionary signals have been displayed, of which twenty-five are reported as fully verified, and five partly verified at the station. Relative to storm of November 17, 18, and 19, 1873, the sergeant remarks: "This was the most severe storm experienced at this place for twelve months past. The coast between Eastport and Boston was strewn with wrecks. Several schooners took shelter at this port, remaining as long as the signal was displayed." The station was inspected in March, 1874, and found in excellent condition. Reports from five other stations are received here in the morning and afternoon of each day, and from twenty-five at midnight.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	4,452
Number of Form 22 issued during the year ending September 30, 1874	27
Number of press-reports issued during the year ending September 30, 1874	7
Total	4,486

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard water-thermometer, one standard minimum thermometer, one standard

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maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one small wind-vane.

ERIE, PA.

(*Official number*, 97.)

Latitude	42° 07′
Longitude	80° 10′
Mean barometer for year ending September 30, 1874	29.993
Mean temperature for year ending September 30, 1874	49°.2
Amount of rain-fall for year ending September 30, 1874	45.65 inches.

The office remains in the building corner Fifth and State streets, where it was located at date of last report. Sergt. E. F. McComas remains in charge, and has made all reports regularly and in a satisfactory manner. One assistant was relieved August 17, 1874, for misconduct, and his place supplied by another instructed man, who still remains. Twenty-four cautionary signals have been displayed, of which number fifteen are reported as verified at the station. Signals are duplicated under the direction of the sergeant in charge, from the Reed House, from which location they are visible from the greater part of the harbor. The station was inspected in July, 1874, and the general appearance of the office reported upon unfavorably by the inspector. Steps have been taken to correct the reported irregularities. The same number of reports are received here as at other stations on the New York and Milwaukee circuit.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	7,704
Number of maps issued during the year ending September 30, 1874	3,922
Number of Form 15 (manifold) issued during the year ending September 30, 1874	2,702
Number of local forms issued during the year ending September 30, 1874	690
Number of Form 22 issued during the year ending September 30, 1874	63
Total	15,081

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, two standard maximum thermometers, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one small wind-vane.

ESCANABA, MICH.

[*Official number*, 49.]

Latitude	45° 46′
Longitude	87° 14′
Mean barometer for year ending September 30, 1874	29.982
Mean temperature for year ending September 30, 1874	40°.1
Amount of rain-fall for year ending September 30, 1874	28.18 inches.

The office was moved, July 15, 1874, from the Tilden House to the corner of Ludington and Dousman streets, in order to secure a better exposure for instruments. The present location is a good one, and well suited for the display of signals. Sergt. Edward Lloyd was in charge until August 27, 1874, when he was transferred to another station, and succeeded by Sergt. James M. Watson. One assistant has been called in since last report for promotion, and his place filled by another instructed man.

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The station was inspected in August, and its condition found to be such that a change in its management was at once made. Twenty-five cautionary signals have been displayed, of which eighteen are reported as verified at the station.

Of the storm of October 13, 1873, the sergeant remarks: "A number of vessels remained in harbor on account of the signal;" and of the storm of June 11 and 12, 1874: "No vessels left port during the display of signals. From information received it appears that a severe storm prevailed on Lake Michigan."

Of storm of September 19 and 20, 1874, he says: "Steamer Alpena left after signals were hoisted, but returned that afternoon on account of rough weather. Four steamers were ready to sail, but remained in."

The telegraphic service at this station has been very much improved since the date of the last annual report.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, two standard water-thermometers, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

FORT BENTON, MONT.

[*Official number*, 71.]

Latitude	47° 52′
Longitude	110° 40′
Mean barometer for year ending September 30, 1874	29.976
Mean temperature for year ending September 30, 1874	42°.5
Amount of rain-fall for year ending September 30, 1874	9.88 inches.

The office remains as at date of last report, and Sergt. Wm. McGillivray continues in charge. There has been no telegraphic communication since January 6, 1874, but all mail reports have been forwarded promptly, and with as much regularity as the mail facilities would permit. As there is no prospect of the telegraph-line being repaired to this point, it is suggested that the station be abandoned.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one standard self-register for anemometer, one standard rain-gauge, one small wind-vane.

FORT GIBSON, IND. T.

[*Official number*, 93.]

Latitude	35° 43′
Longitude	95° 16′
Mean barometer for year ending September 30, 1874	29.991
Mean temperature for year ending September 30, 1874	60°3
Amount of rain-fall for year ending September 30, 1874	39.16 inches.

The office is located in one of the best buildings in the town, and affords an excellent exposure for the instruments. Sergt. T. A. Taylor was relieved March 2, 1874, upon the recommendation of the inspecting officer. His successor, Sergt. S. B. Lum, was relieved March 25, 1874, by Sergt. B. C. Anderson, who still remains and gives satisfaction

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There is one assistant on duty, who is favorably mentioned by the sergeant for good conduct and steady habits. Both men are fair telegraph operators. The station was inspected in February, 1874, and found in such bad condition that the sergeant was immediately relieved. Reports from other stations are not received here.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, two standard maximum thermometers, one standard minimum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one small wind-vane, one standard rain-gauge.

FORT SULLY, DAK.

[*Official number*, 83.]

Latitude	44° 39′
Longitude	100° 40′
Mean barometer for the year ending September 30, 1874	29.912
Mean temperature for the year ending September 30, 1874	46°.2
Amount of rain-fall for the year ending September 30, 1874	14.89 inches.

No change has been made in the location of the office since the date of last annual report. Sergt. William Ramsay was in charge until called in for discharge, January 23, 1874, and succeeded by Sergt. C. E. Brinsmade, who still remains and has given satisfaction by the promptness and regularity with which he has forwarded all reports. The services of an assistant becoming necessary to keep the telegraph-line in repair, Private H. M. Wells was ordered to the station April 3, 1874. On September 1 he was moved to Fort Thompson, in order that he might attend more readily to the line between Forts Sully and Randall.

The station was inspected in June, 1874, and found in good condition. Since that date, however, the station barometer has been broken and is not yet replaced. Observations are made with the barometer at post hospital.

Two barometers, sent from the central office, have reached the station in an unserviceable condition.

INSTRUMENTS ON STATION.

Three standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

GALVESTON, TEX.

[*Official number*, 55.]

Latitude	29° 18′
Longitude	94° 50′
Mean barometer for year ending September 30, 1874	30.051
Mean temperature for year ending September 30, 1874	72°.8
Amount of rain-fall for year ending September 30, 1874	54.49 inches.

No change has been made in the location of the office since the establishment of the station, nor is any considered necessary, as the exposure for instruments and means of access to the leading business-places are as good as can be found in the city.

Sergt. E. O'C. McInerney continues in charge and has performed all his duties zealously and intelligently. There is one assistant at present

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on duty, who is favorably mentioned by the sergeant for good conduct, but whose relief is recommended on the ground of ill health. The station was inspected in February, 1874, and found in good condition.

The following extracts are given from the reports of the sergeant:

The members of the "cotton exchange" take deep interest in our reports, which are regularly furnished them, and some time since, at one of the meetings, drew up, and with unanimous consent forwarded, a series of resolutions to the honorable Secretary of War praying for an extension of the system and an increase of stations in Texas and the other cotton-producing States.

The Chamber of Commerce in its annual review (a copy of which I forwarded to Washington) speaks in the most complimentary manner possible of the benefits it has already derived from the signal service, and points out the future advantages which agriculture and the various departments of commercial industry will derive from its labors, and the useful knowledge its full development is sure to spread among the people.

The farmer, the sailor, the merchant, the cotton factor, the physician, the journalist, and the scientist, are all alike deeply and favorably impressed with the importance and utility of the signal-service system; those in every walk of life and profession look on it and accept it as one of the necessary and indispensable institutions of the land.

In March, Dr. Wilkinson, of this city, called on me for such statistical information as I could furnish him of the rain-fall, temperature, &c., of the summer of 1873, that he might submit the same to the medical convention at Dallas, Texas, which was held chiefly for the purpose of investigating the causes and peculiarities of diseases in general, but more particularly of yellow fever.

The condition of the atmosphere, its extremes of temperature and moisture, is almost universally admitted to be a powerful agent in the prevention or production of this much-dreaded disease. Hence the desire of the Dallas convention for accurate and reliable information.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	113
Number of press-reports issued during the year ending September 30, 1874	482
Number of local reports issued during the year ending September 30, 1874	40
Number of Forms 22 issued during the year ending September 30, 1874	26
Number of monthly reports for the cotton exchange	5
Total	666

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

GRAND HAVEN, MICH.

[*Official number*, 48.]

Latitude	43° 05′
Longitude	86° 18′
Mean barometer for year ending September 30, 1874	30.005
Mean temperature for year ending September 30, 1874	47°.0

The office remains at the corner of Fourth and Washington streets, as at date of last report. The location is a poor one for the display of cautionary signals, but good in other respects. The expense of putting up the suitable flag-staff has prevented the duplication of signals from a point from where they would be visible to passing vessels.

Sergt. F. F. Wood was in charge of station until April 1, 1874, when he was ordered in for discharge, and was succeeded by Sergt. A. J. Berry, who still remains. An assistant was ordered here in October, 1873.

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The station was inspected in August, 1874, and the general management reported upon unfavorably.

Twenty-five cautionary signals have been displayed, of which number fifteen are reported as verified at the station.

PUBLICATIONS.

Number of local reports issued during year ending September 30, 1874	718
Number of Forms 22 issued during year ending September 30, 1874	19
Total	737

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

INDIANAPOLIS, IND.

[*Official number*, 43.]

Latitude	39° 47′
Longitude	86° 06′
Mean barometer for the year ending September 30, 1871	30.022
Mean temperature for the year ending September 30, 1874	54°.4
Amount of rain-fall for the year ending September 30, 1874	46.26 inches.

The office remains at the corner of Washington and Meridian streets, and is well located. The only change made during the year was the removal to other rooms in the same building to accommodate the wants of the telegraph company. Sergt. C. F. R. Wappenhans remains in charge, and, as in previous years, has performed his duties satisfactorily.

There is one assistant now on duty, and two have been called in for promotion during the year.

The station has been twice inspected, once in December, 1873, and again in September, 1874, and on both occasions was found in excellent condition. The inspector reports that the sergeant understands his work thoroughly and gives his whole time to his office duties. The only change recommended was in the instrument-shelter, which has been ordered. The following extracts are given from the semi-annual report of the sergeant for June 30, 1874:

Freight-agents of the different railroads have often made use of these records in noting the prevalence of rain and the force or amount of rain-fall.

During the winter, pork-packers requested to be furnished with a table of temperatures for each day of the past month, to select their packages for shipment according to the higher or lower temperature prevailing when the animal was killed and the meat was packed, as it was to their advantage to send off such meat first of the animal when killed during a more moderate temperature.

The probabilities published in the papers are read with great reliance in their correctness by almost every reader of the different papers, and I know that the labors of builders, contractors, painters, owners of brick-yards, and others have been regulated according to the probable state of the weather as expressed in the probabilities.

To illustrate one of the many instances of the usefulness of timely information of an approaching freezing temperature, permit me to state the following:

Mr. Mallot, a gentleman largely interested in the cutting of ice, at La Porte, in the northern part of the State, had been in daily communication with this office, when in this city, by personal application or receipt of bulletins, or when absent at La Porte, by telegraphic communication.

Some time during the latter part of the past winter a rain had set in, melting part of the still remaining ice, or at least covering it with water to the depth of several inches. It being late in the season many of the ice-men at La Porte, from Louisville, Chicago, and other places, believing that the opportunity of cutting more ice this winter had passed, returned therefore to their homes. Seeing, by a very low temperature prevail-

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ing in the west and northwest, that it would also extend to this place, although, perhaps, in not so severe a degree, Mr. Mallot was informed, by telegraph, that freezing weather was expected in about forty-eight hours. On this information he immediately built an ice-house, near a lake where the ice had not been disturbed by cutting before it was covered by rain, and made further preparation for immediate action should the ice become thick enough.

The lower temperature reached La Porte somewhat earlier than anticipated, and very soon the ice was thick enough for cutting. Early Monday morning Mr. Mallot employed all the force he could muster to cut ice, and continued to do so uninterrupted for more than three days, permitting him thereby to fill all his contracts, which had been very doubtful heretofore.

After the frost had set in the ice-men, who had gone home, returned; but, too late, for when they had finished their preparations for cutting and housing the ice, the frost diminished, and the ice, thawing, was soon driven out of the lake.

Mr. Mallot, being also a managing officer of the Indianapolis and Peru Railroad, made use of the weather reports to arrange his trains, for whenever there were indications of a cessation of freezing weather, cars and locomotives used for the transport of ice at one end of the road could be used to better advantage at other points until, at an indication of the return of frost, or its continuance, more cars could be sent to those points where ice was cut.

This station is on the Chicago and Cincinnati circuit, and receives twenty-one reports in the morning and afternoon, and seventy-two at midnight. These reports have recently been published by the daily newspapers in excellent form, and it is believed their publication will be continued regularly hereafter.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	8,405
Number of local reports issued during the year ending September 30, 1874	824
Number of Form 15 (manifold) issued during the year ending September 30, 1874	6,737
Number of Form 22 (manifold) issued during the year ending September 30, 1874	89
Number of Form 26 (manifold) issued during the year ending September 30, 1874	425
Total	16,480

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

INDIANOLA, TEX.

[*Official number*, 84.]

Latitude	28° 32′
Longitude	96° 38′
Mean barometer for the year ending September 30, 1874	30.075
Mean temperature for the year ending September 30, 1874	70°.0
Amount of rain-fall for the year ending September 30, 1874	45.32 inches.

No change has been made in the location of office since date of last report, and Sergt. Frank Mansfield still remains in charge, and has forwarded all reports regularly and in a satisfactory form. An assistant was sent to the station February 17, 1874, and has not been removed up to this date. The station was inspected in February, 1874, and found in good condition. There is considerable interest manifested in the service, chiefly among the masters of the coasting-vessels which enter this port.

PUBLICATIONS.

Number of Form 22 issued during the year ending September 30, 1874	44
Number of weekly means issued during the year ending September 34, 1874	38
Total	82

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INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, two standard minimum thermometers, one standard maximum thermometer, one standard water thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

JACKSONVILLE, FLA.

[*Official number*, 73.]

Latitude	30° 24′
Longitude	80° 40′
Mean barometer for the year ending September 30, 1874	30.090
Mean temperature for the year ending September 30, 1874	69°.3
Amount of rain-fall for the year ending September 30, 1874	56.53 inches.

The office remains in the Freedman's Bank building, as at last report, and no change has been made in the men on duty. Sergt. R. McLaughlin has performed his duties satisfactorily, and rendered all reports promptly and properly. Both the sergeant and his assistant are warmly commended by the inspecting officer, who visited the station in December, 1873, and found office and records in excellent condition. Seven cautionary signals have been displayed, of which three are reported as verified at the station. The sergeant reports that "the parties deriving the most benefit from the service at this point are the lumber-shippers, and shipping in general. In the underwriters' agency is posted a notice to vessels not to leave port while the signal flag is flying, and which is universally observed by them, whether they are insured or not."

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	4,847
Number of local reports issued during the year ending September 30, 1874	153
Number of Form 22 issued during the year ending September 30, 1874	69
Total	5,069

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

KEOKUK, IOWA.

[*Official number*, 47.]

Latitude	40° 23′
Longitude	91° 25′
Mean barometer for the year ending September 30, 1874	29.995
Mean temperature for the year ending September 30, 1874	52°.4
Amount of rain-fall for the year ending September 30, 1874	44.76 inches.

The office remains at the corner of Main and Second streets, and is well located. Sergt. James H. Marsh was relieved November 8, 1873, for misconduct, and succeeded by Sergt. T. S. Collins, who remained until transferred to another station, July 15, 1874, since which date Sergt. William Black has been in charge. One assistant has been relieved during the year for misconduct, and his place supplied by a competent man. The station was inspected in April, 1874, and found in good condition. The river reports are of value to shippers and river-men, and this is the

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particular class who manifest the most interest and derive the most benefit from the reports. From the probabilities furnished the press they can tell what will probably be the condition of the weather North, and from the local bulletins posted they ascertain the actual condition of the weather, and from the river reports know the stage of water, thus enabling them to regulate their shipments so as to insure the safe delivery of the same. Contractors and engineers who are constructing levees, bridges, and other public works receive the benefits of the river reports when called for by them; and one gentleman, Mr. E. L. Corttrell, chief engineer of the Sny Island levee, Louisiana, Mo., has been furnished reports of the rise and fall of the river daily during the past two years.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	3,166
Number of maps issued during the year ending September 30, 1874	11
Number of local reports issued during the year ending September 30, 1874	48
Number of Form 22 issued during the year ending September 30, 1874	24
Number of Form 26 issued during the year ending September 30, 1874	2,519
Total	5,768

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

KEY WEST, FLA.

[*Official number*, 25.]

Latitude	24° 32′
Longitude	81° 48′
Mean barometer for the year ending September 30, 1874	30.06
Mean temperature for the year ending September 30, 1874	76°.8
Amount of rain-fall for the year ending September 30, 1874	.3468 inches.

The office remains in the Louvre Hotel, as at date of last report, and is within easy reach of the principal public offices and business-houses. Sergt. B. C. Anderson was relieved on account of ill-health March 28, 1874, and succeeded by Sergt. John D. Sumet. Both men have attended faithfully to their duties, and forwarded reports as promptly as the mail and telegraphic facilities would permit.

One assistant was called in for promotion during the year, and succeeded by another instructed man, who is still on duty. The station was inspected in January, 1874, and found in fair condition.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	2,935
Number of press-reports issued during the year ending September 30, 1874	51
Number of Form 22 issued during the year ending September 30, 1874	2
Total	2,988

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard water-thermometer, one standard minimum thermometer, two standard maximum thermometers, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

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KNOXVILLE, TENN.

[*Official number*, 42.]

Latitude	35° 56′
Longitude	83° 58′
Mean barometer for the year ending September 30, 1874	30.071
Mean temperature for the year ending September 30, 1874	57°.5
Amount of rain-fall for the year ending September 30, 1874, 63.50 inches.	

The office remains in the university as at last report, and is given without cost to the United States.

Sergt. John K. Payne remains in charge, and has given satisfaction. All reports have been made promptly and satisfactorily.

An assistant was assigned to the station in December, 1873, and was called in for promotion in August, 1874, and succeeded by another competent man. The station was inspected in April, and found in excellent condition.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	920
Number of press-reports issued during the year ending September 30, 1874	312
Number of Form 22 issued during the year ending September 30, 1874	34
Total	1,266

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

LA CROSSE, WIS.

[*Official number*, 87.]

Latitude	43° 48′
Longitude	91° 23′
Mean barometer for the year ending September 30, 1874	30.035
Mean temperature for the year ending September 30, 1874	45°.9′
Amount of rain-fall for the year ending September 30, 1874, 31.04 inches.	

The only change made in the office at the station during the year has been its removal from the room formerly occupied to another and better one in the same building. Sergt. Richard Williams was relieved October 6, 1873, and called in for discharge. He was succeeded by Sergt. W. E. Smith, who still remains, and has given satisfaction. An assistant was furnished him from June 20, 1874, to September 14, 1874, on account of his ill-health. The station was inspected in May, 1874, and found in good condition.

PUBLICATIONS.

Number of press-reports issued during the year ending September 30, 1874	642
Number of Form 22 issued during the year ending September 30, 1874	15
Total	657

INSTRUMENTS ON STATION.

One standard barometer, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

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LAKE CITY, FLA.

[*Official number*, 24.]

Latitude	30° 13′
Longitude	82° 40′
Mean barometer for the year ending September 30, 1874	30.087
Mean temperature for the year ending September 30, 1874	67°.7
Amount of rain-fall for the year ending September 30, 1874, 40.15 inches.	

No change has been made in the location of the office during the year, nor has any been made in the men on duty. Sergt. A. D. Woolcott continues in charge, and has one assistant. All reports have been made promptly and in creditable form. The station was inspected in December, 1873, and found in good condition. But little interest is taken in the service here, and as the only object of its establishment has been rendered useless by the consolidation of the telegraph-offices, its removal to some more desirable location is recommended.

INSTRUMENTS ON STATION.

Two standard barometers, three standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

LEAVENWORTH, KANS.

[*Official number*, 52.]

Latitude	39° 19′
Longitude	94° 58′
Mean barometer for the year ending September 30, 1874	29.978
Mean temperature for the year ending September 30, 1874	54°.4
Amount of rain-fall for the year ending September 30, 1874	35.04 inches.

The office remains at No. 315 Delaware street, and is well located for business purposes. Sergt. George S. Rowley was relieved February 17, 1874, and upon the recommendation of the inspecting officer reduced to the rank of a private soldier for neglect of duty. He was succeeded by Sergt. H. M. Wells, who also neglected his duty, and was reduced, being relieved March 26, 1874, by Sergt. E. McGovern, who stills remains in charge and performs his duties satisfactorily. Two assistants are now on duty, one of whom is a printer charged with the issue of farmers' bulletins, which are supplied regularly to 210 post-offices. One assistant has been called in for promotion during the year, one transferred to another station, one to the central office, and one relieved for misconduct. The station was inspected in March, 1874, and found in poor condition. It is believed, however, that at present it is greatly improved, as all reports are made regularly and satisfactorily, and the amount of work done sufficient to keep the men busy.

PUBLICATIONS.

Number of farmers' bulletins issued during the year ending September 30, 1874	103,935
Number of bulletins issued during the year ending September 30, 1874	1,736
Number of press-reports issued during the year ending September 30, 1874	369
Number of local reports issued during the year ending September 30, 1874	415
Number of Form 22 issued during the year ending September 30, 1874	88
Number of Form 26 issued during the year ending September 30, 1874	1,331
Total	107,874

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INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

LEXINGTON, KY.

[*Official number*, 90.]

Latitude	38° 08′
Longitude	84° 33′
Mean barometer for the year ending September 30, 1874	30.049
Mean temperature for the year ending September 30, 1874	55°.5
Amount of rain-fall for the year ending September 30, 1874	50.04 inches.

The office remains in the university building as at last report, and is still in charge of Sergt. W. S. Jewell. All reports have been rendered promptly and satisfactorily, and the sergeant's conduct is favorably mentioned by the regents of the university. Since the 3d of March, 1874, the midnight reports from twenty-one stations have been received here once a day from Cincinnati, and are published in the usual manner.

This station has never been inspected.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	1,775
Number of local reports issued during the year ending September 30, 1874	98
Total	1,873

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one minimum thermometer, one maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

LOGANSPORT, IND.

[*Official number*, 124.]

This is a printing station, established for the distribution of farmer's bulletins, and is in charge of Corporal Lloyd Prather, who has one assistant. The first bulletin was issued July 15, 1874, and since that date 21,666 bulletins have been issued to 196 post-offices. The average time of receiving the synopsis and probabilities from the central office, via Cincinnati, is 2 a. m., and the average time of mailing the printed copies 4.30 a. m. The work has been well done, and no issues have been missed up to this date. The office is located at No. 48 Fourth street, between Broadway and Market streets.

LONG BRANCH, N. J.

[*Official number*, 113.]

Latitude	40° 18′
Longitude	73° 59
Elevation of barometer above sea-level	28 feet 7 inches.

The station was established December 10, 1873, by Sergt. George W. McKee, who remained in charge until his death from typhoid fever,

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September 14, 1874. He was succeeded by Corporal Isaac T. Shadle, who had been his assistant since the station was opened. Sergeant McKee was an intelligent, faithful man, who attended to all his work with scrupulous fidelity, and died at his post like a true soldier. The office is in the life-saving house north of the town of Long Branch, and is well located. The instrument-shelter is of the standard portable pattern. A full set of flags, for the International code, is on the station, and the men on duty instructed in their use. The office is connected by telegraph with the central office, and full reports are sent regularly, as at the other sea-coast stations. Nineteen cautionary signals have been displayed, of which number fifteen have been fully verified at the station. The line from Sandy Hook to Barnegat is repaired from this point.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one standard rain-gauge, one small wind-vane.

LOUISVILLE, KY.

[*Official number*, 64.]

Latitude	38° 18′
Longitude	85° 52′
Mean barometer for the year ending September 30, 1874	30.039
Mean temperature for the year ending September 30, 1874	57°.2
Amount of rain-fall for the year ending September 30, 1874	43.33 inches.

The office is located on the fifth floor of a building at the corner of Main and Bullitt streets, and is within easy reach of the principal public buildings and business houses.

Sergt. J. W. Craig was in charge until July 27, 1874, when he was relieved for misconduct and succeeded by Sergt. James H. Marsh, his assistant, who was promoted on station. One assistant was relieved March 20, 1874, for misconduct; the present assistant gives satisfaction.

The station was inspected in January, 1874, and again in September, 1874.

Reports are received here from seven stations each morning and midnight, and from twenty stations in the afternoon.

The newspapers publish all reports furnished to them, and the citizens, generally, take great interest in the service.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30,1874	11,807
Number of press-reports (local) issued during the year ending September 30,1874	1,820
Number of Form 15 (manifold) issued during the year ending September 30,1874	800
Number of Form 22 issued during the year ending September 30, 1874	64
Number of Form 26 issued during the year ending September 30, 1874	7,541
Total	22,032

Twenty-three weather-maps are received here daily from Cincinnati, and displayed in the principal public buildings.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one minimum thermometer, one maximum thermometer, one water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

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LYNCHBURGH, VA.

[*Official number*, 44.]

Latitude	37° 30′
Longitude	79° 02′
Mean barometer for the year ending September 30, 1874	30.072
Mean temperature for the year ending September 30, 1874	56°.5
Amount of rain-fall for the year ending September 30, 1874	44.74 inches.

The location of the office has not been changed during the year, and Sergt. H. U. Jones continues in charge. His reports, both mail and telegraphic, have been forwarded regularly and in creditable form.

Although the only reports received here are those from Knoxville, considerable interest is manifested in the service, especially by the tobacco-manufacturers, who are governed to a great extent, in arranging their work, by the probabilities issued from the central office.

The local newspapers print all observations furnished them. The station was inspected in April, 1874, and found in good condition.

PUBLICATIONS.

Number of local press-reports issued for the year ending Spetember 30, 1874	934
Number of Form 22 issued for the year ending September 30, 1874	36
Total	970

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemomoter, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

MARQUETTE, MICH.

[*Official number*, 50.]

Latitude	46° 33′
Longitude	87° 36′
Mean barometer for the year ending September 30, 1874	29.980
Mean temperature for the year ending September 30, 1874	40°.8
Amount of rain-fall for the year ending September 30, 1874	21.32 inches.

No change has been made in the location of the office, nor is any considered desirable, as the present one is well adapted for the exposure of instruments and display of signals.

Sergt. W. H. Clendenon remains in charge, and has performed all his duties intelligently and satisfactorily. Since April 9, 1874, he has had an assistant, as the receipt of signal-orders made the work too severe for one man.

The station was inspected in August, 1874, and found in excellent condition.

Twenty-one cautionary signals have been displayed, of which number thirteen are reported as verified at the station. The sergeant reports:

Frequent applications for information concerning the anticipated state of the weather have been made during the spring and summer by persons having business or pleasure on the water in this vicinity, and in most cases reliable information was furnished them. One gentleman, in particular, who is largely interested in mining, has made several calls in quest of information relative to atmospheric humidity, and at one time, when the hygrometer showed the atmosphere to be very dry, he immediately telegraphed to the mines (distant forty miles) to turn-out all hands to guard against fires in the woods, the settlement having been burned out last year during similar weather.

Reports from other stations are not received here.

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INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard maximum thermometer, one standard minimum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register to anemometer, one standard rain-gauge, one standard wind-vane.

MEMPHIS, TENN.

[*Official number*, 62.]

Latitude	35° 07′
Longitude	90° 07′
Mean barometer for the year ending September 30, 1874	30.098
Mean temperature for the year ending September 30, 1874	61°.6
Amount of rain-fall for the year ending September 30, 1874	49.39 inches.

The office is at No. 254 Second street, and is well located. Sergt. S. W. Rhode was transferred, September 14, 1874, to another station, having served here continuously and faithfully since August 28, 1871. He was succeeded by Sergt. H. M. Ludwig. There are two assistants on duty, one of whom is a printer, charged with the issue of farmers' bulletins, which are supplied regularly to sixty post-offices. One assistant has been called in during the year for promotion, and one transferred to the central office. The station was inspected in January, 1874, and found in excellent condition. Referring to Sergeant Rhode, the inspector remarks: "His valuable services rendered during the late epidemic, as a member of the Howard Association, have won for him a reputation of which he may well be proud." The chairman of the meteorological committee, Mr. Semmes, urges strongly the establishment of a special river station at Randolph, on the Mississippi, above Memphis, during the winter months at least, to give timely warning of floods and ice gorges at that point. The following extracts from the semi-annual reports of Sergeant Rhode refer to the interest in the service manifested by the citizens:

Owing to the fact that the cholera, in an epidemic form, prevailed here during the greater portion of the latter part of last year, the service has made but little advancement. Business has been partly, and for a short time entirely, suspended during that period. The city for four months was nearly depopulated. The river-travel and the business were almost entirely suspended for three months; consequently there was no one here to be benefited by our reports. The observations were taken regularly and promptly during the epidemic, though very often there were doubts whether any of us would escape the dreaded scourge. A large number of physicians and scientific men have called upon me for meteorological data during the period of the late yellow-fever epidemic. The value of these observations during that time has been fully demonstrated. I have in every instance been able to furnish all the information desired.

The Farmers' Bulletins have been issued regularly, and from verbal reports I have received from a number of places where they are posted, I am led to believe that the agricultural community have been greatly benefited by this system of diffusing reports and prognostics of the service. During the overflow of the Mississippi and its tributaries during the past six months the value of the river-report was conclusively proven. Planters in the valley south of this station were daily informed by the telegraph and press of the condition of the upper rivers, and were thus enabled to prepare for the flood long before it reached them.

Levee superintendents were informed in time for them to strengthen the levees, and it is owing to this fact that the damage done was not greater.

The reports of the service are watched, read, and used by almost all classes of persons. Mr. Victor D. Fuchs, a large dealer in oysters, fish, game, &c., buys and sells his goods by the reports of this service. The railroad, express, and steamboat companies use the reports very often to determine to whom to charge the damage to goods by exposure and so forth.

The cotton merchants are frequent applicants for information.

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Large quantities of cotton, in passing through different persons' hands, are often damaged by exposure to the weather. Such cases as these are often brought into court, and to determine at what time the weather was such as to damage exposed cotton, recourse is had to reports, which are very beneficial in this respect.

PUBLICATIONS.

Number of farmers' bulletins issued during the year ending September 30, 1874	40,262
Number of bulletins issued during the year ending September 30, 1874	3,789
Number of press-reports issued during the year ending September 30, 1874	6
Number of Form 22 issued during the year ending September 30, 1874	38
Number of Form 26 issued during the year ending September 30, 1874	3,204
Total	47,299

INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard water-thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, standard rain-gauge, one stanard wind-vane.

MILWAUKEE, WIS.

[*Official number*, 38.]

Latitude	43° 03′
Longitude	87° 54′
Mean barometer for the year ending September 30, 1874	30.036
Mean temperature for the year ending September 30, 1874	45°.8
Amount of rain-fall for the year ending September 30, 1874	31.95 inches.

The office is located as at last report—in the building of the Northwestern Life Insurance Company, at the corner of Wisconsin street and Broadway. Sergt. H. M. Ludwig was in charge until September 14, 1874, when he was transferred to Memphis, Tenn., and succeeded by Sergt. S. W. Rhode, who remains in charge and forwards all reports regularly and satisfactorily.

The station was inspected in August, 1874, and the general appearance of the office found satisfactory. Two assistants are now on duty, and two have been called in during the year for promotion. Twenty-five cautionary signals have been displayed, of which number seventeen are reported as fully verified at the station. Of the storm of October 28 and 29, 1873, the sergeant remarks:

"Numerous vessels remained in port. The master of the schooner Stella returned thanks for timely warning;" and of storm of June 11 and 12, 1874: "Small vessels remained in port during gale; numerous visits from lake-men."

In his semi-annual report, the sergeant says:

Among the citizens, and especially the shipping fraternity, the signal service is regarded as a necessity to commerce.

In the early part of June the editorial convention meeting in this city, a number of that body favored this office with a visit, and all expressed a high opinion of the service, and volunteered the information that the same state of feeling existed in the agricultural districts where the probabilities are received.

Referring to the cautionary displays, I may briefly state that the observance and individual interest has become a marked necessity with the business men in general.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	7,513
Number of maps issued during the year ending September 30, 1874	3,148
Number of local reports issued during the year ending September 30, 1874	28

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Number of Form 15 (manifold) issued during the year ending September 30, 1874	4,335
Number of Form 22 (manifold) issued during the year ending September 30, 1874	47
Total	15,071

INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one wind-vane.

MOBILE, ALA.

[*Official number*, 27.]

Latitude	30° 42′
Longitude	88°.59′
Mean barometer for year ending September 30, 1874	30.092
Mean temperature for year ending September 30, 1874	67°.6
Amount of rain-fall for year ending September 30, 1874	58.20 inches.

The location of the office has not been changed during the year. It is central and convenient to most of the public offices, and, in a meteorological point of view, as good as can be obtained within the city limits. Sergt. D. O'Donoghue has been on duty here since November, 1871, and has performed all his work in an intelligent and satisfactory manner. One assistant has been called in for promotion during the year, and was succeeded by another instructed man. The station was inspected in January, 1874, and found in excellent condition. Five cautionary signals have been displayed, of which three are reported as justified at the station. All reports passing over the New Orleans and Augusta circuit have been received here since February, 1874, and selections from them are published by the daily press.

The following extracts from the sergeant's reports are given to show the local interest taken in the service:

The citizens take a lively interest in the reports. The secretaries of the board of trade and cotton-exchange are most anxious to have the reports increased. The cotton-exchange in particular has been most desirous to receive reports from the cotton-districts. As regards the probabilities, they are relied upon, and if it happen that they are not strictly accurate for Mobile alone, not taking the entire Gulf States in account, some seem to be disappointed.

As an evidence of the usefulness of the Signal-Service, beyond the purpose for which it was originally intended, it is well to state the following: In December, 1872, a large lot of cotton was purchased by an English merchant, and before or during the loading of the ship, the cotton was badly damaged by water. The English merchant brought suit against the Mobile merchant for not furnishing the cotton at the appointed time. The plea set up was to the effect that the weather was rainy and cloudy during the time allowed for drying the cotton, so that it was not delivered till long after the term of the contract.

The lawyer of the English merchant applied at this office, in April, 1874, for the number of cloudy and rainy days during December, 1872, and January, 1873, which this office was able to furnish. The weather-reports clearly sustained the plea in the case. It is well to state for your information, that the medical profession in this city are taking a very great interest in the daily reports.

On March 20, 1874, a letter was received from the secretary of Galveston, Texas, Medical Association, requesting to be furnished with the weekly mean temperature and humidity for June, July, August, and September. The request was complied with, and the mean daily barometer, thermometer, humidity, and the amount of rain-fall for each day, and prevailing wind, sent, and the month of October included, in addition.

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PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874,	3,841
Number of press-reports issued during the year ending September 30, 1874.	1,045
Number of Form 15 (manifold) issued during the year ending September 30, 1874,	1,775
Number of Form 22 issued during the year ending September 30, 1874	37
Total	6,698

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

MONTGOMERY, ALA.

[*Official number*, 26.]

Latitude,	32° 22′
Longitude,	86° 23′
Mean barometer for the year ending September 30, 1874,	30.095
Mean temperature for the year ending September 30, 1874,	65°.8
Amount of rain-fall for the year ending September 30, 1874	Blank.

The office is located at No. 10 Market street, on the third floor of a four-story building in immediate proximity to the principal business and public offices in the city. The roof exposure for the instruments is good, and the instrument-shelter of the standard pattern. Sergt. Geo. A. Clum was relieved from charge, February 2, 1874, and succeeded by Sergt. E. T. Carvalho, who left the station without authority, September 17, 1874, while laboring under a temporary attack of insanity.

The duties were performed by Private Mayhew until the arrival of Corp. W. J. Evans, September 21. Sergeant Clum was sick from October 8 to November 5, 1873, and Sergt. J. F. Tenny was sent to work the station during that time.

There are two assistants on duty, one of whom is a printer, charged with the issue of farmer's bulletins, which are furnished to 45 offices. One assistant was called in for discharge during the year, and one transferred to another station. The station was inspected in January, 1874, and found in fair condition. All reports passing over the New Orleans and Augusta circuit are received here, and selections from them published by the local press.

The sergeant reports that "the benefits derived from the reports of the Signal-Service at this station are mainly restricted to the cotton-growing interests of the State. The reports on temperature and amount of rain-fall are taken notice of, as these phenomena are recognized to influence the prospects of the cotton-crop more than any other, and the cotton-merchants and others interested will be enabled to base on the reports their calculation for this special branch of the mercantile trade."

PUBLICATIONS.

Number of farmer's bulletins issued during the year ending September 30, 1874	22,001
Number of bulletins issued during the year ending September 30, 1874	3,314
Number of press-reports issued during the year ending September 30, 1874	444
Number of Form 22 issued during the year ending September 30, 1874	70
Number of local reports issued during the year ending September 30, 1874	129
Total	25,958

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INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

MORGANTOWN, W. VA.

[*Official number*, 92.]

Latitude	39° 36′
Longitude	79° 52′
Mean barometer for year ending September 30, 1874	30.022
Mean temperature for year ending September 30, 1874	53°.5
Amount of rain-fall for year ending September 30, 1874	47.04 inches.

The office remains in the university, and has been in charge of Sergt Lawrence Dunne since November 8, 1873, on which date he relieved Sergeant Fee, who was called in for misconduct.

Telegraphic reports are not sent from this station except in special cases. All mail-reports have been made with commendable neatness and regularity. The station has not been inspected during the year. Local observations have been published weekly in the Morgantown Weekly Post.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one minimum thermometer, one maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one small wind-vane.

MT. WASHINGTON, N. H.

[*Official number*, 46.]

Latitude	40° 16′ 25″
Longitude	71° 16′ 26″
Mean barometer for the year ending September 30, 1874	29.968
Mean temperature for the year ending September 30, 1874	25°.6
Amount of rain-fall for the year ending September 30, 1874	82·97 inches.

The office remains in the building constructed for the station last year, which has been found comfortable and well adapted to the uses for which it was designed. Sergt. A. R. Thornett remained in charge until June 1, 1874, when, at his own request, he was transferred to the Portland station, and succeeded by Sergt. William Line, who had been his senior assistant since September 17, 1872. Both these sergeants have performed their duties intelligently and satisfactorily. Two assistants are now on the station, one of whom has been there over a year, and both of whom are hardy, reliable men.

The station was inspected in October, 1873, and found in fair condition.

Considerable trouble has been experienced in keeping the instruments in repair, and at the present time there is no serviceable anemometer on the station. One has been made, however, especially designed to withstand the strong winds and frosts to which the location is subjected, and will be forwarded in time for use during the ensuing winter.

The telegraph-line has been repaired, and in a great measure replaced by new wire, and is now in good working order.

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The situation of the men upon this station has been greatly improved since its first occupation in 1870.

INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard minimum thermometer, four standard maximum thermometers, one standard hygrometer, four standard anemometers, one self-register for anemometer, one small wind-vane, two standard rain-gauges.

NASHVILLE, TENN.

[*Official number*, 63.]

Latitude	36° 11′
Longitude	86° 53′
Mean barometer for year ending September 30, 1874	30 .065
Mean temperature for year ending September 30, 1874	61°.3
Amount of rain-fall for year ending September 30, 1874	59.76 inches.

Location of office remains unchanged. Sergt. A. C. Ford remains in charge, and has performed his station duties in a satisfactory manner. One assistant was called in for promotion July 20, 1874.

There are two assistants at present on duty, one of whom is a printer, having charge of the issue of farmers' bulletins. The station was inspected in January, 1874, and found in excellent condition.

The office has furnished meteorological data to numerous applicants during the year. In addition to the local reports in the daily newspapers, copies of monthly and annual reports have been furnished to the State offices, and also to agricultural societies throughout the State.

The extreme high water in the Cumberland River during the month of April made the river-reports especially valuable.

PUBLICATIONS.

Number of farmers' bulletins issued during year ending September 30, 1874	61,714
Number of bulletins issued during year ending September 30, 1874	8,104
Number of local-press reports issued during year ending September 30, 1874	634
Number of Forms 15 (manifold) issued during year ending September 30, 1874	880
Number of Forms 22 issued during year ending September 30, 1874	135
Number of Forms 26 issued during year ending September 30, 1874	3,647
Total	75,114

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one minimum thermometer, one maximum thermometer, one water thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

NEW HAVEN, CONN.

[*Official number*, 96.]

Latitude	41° 17′
Longitude	72° 57′
Mean barometer for the year ending September 30, 1874	30. 046
Mean temperature for the year ending September 30, 1874	48°.2
Amount of rain-fall for the year ending September 30, 1874	64.04 inches.

The office remains in the sixth story of the insurance building, at No. 368 Chapel street, and its location could not be improved upon. Sergt. Wm. Black was in charge until July 15, 1874, when he was transferred to another station and succeeded by Sergt. F. P. Bayes.

Telegraphic reports are not sent from this station except in special cases. All mail-reports have been forwarded regularly and promptly.

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The station was inspected in November, 1873, and found in excellent condition.

Twenty-eight cautionary signals have been displayed, of which number eighteen are reported as fully verified and one as partly verified at the station. Of storm of February 13 and 14, 1874, the sergeant remarks: "The storm was very severe on the sound. On the night of the 13th and 14th, and about 24 hours after signal was hoisted, numerous disasters occurred to vessels bound to this port, two of which went down only a few miles from the station. No vessels cleared while signal was flying;" and of storm of September 17, 18, and 19, 1874, he says, "Steamer Continental, for New York, left, but had to return. Storm did much damage in country."

The following extracts are given from the sergeant's semi-annual report for June 30, 1874:

During the May term of the court of common pleas, held in this city, while a legal case was pending, in which it was alleged that one party had released water from a sewer and inundated property of the other, the records of the station were brought into evidence. This testimony refuted a damaging argument against the complainant, that the overflow was due to a copious rain, showing that none had fallen, as stated.

Professor John Osborn, chief engineer of the Fair Haven Water Company, of this city, has devised some method of obtaining from the records of temperature and rain-fall the condition of the water in the company's reservoirs or lakes, which are situated about two miles distant from the station, on high hills. The professor calls at the office-rooms after nearly every rain-storm, and makes deductions from the observations. By request of the mayor, and after approval by the Chief Signal-Officer, a brief summary of the station-observations for 1873 was contributed to the city year-book for that year. This recapitulation was published in excellent form, and is regarded as comprising a very important item in the compilation.

The press-reports appear to have attracted considerable attention, as shown in several interviews had with the editors of two papers published here. The first informed me that the probabilities appeared "to be the most important item appearing in (his) our columns. In several instances, when telegraph was interrupted so that the probabilities could not be published, numerous communications have been received from our country subscribers calling attention to the omission. The paper appears to be incomplete without it." The second remarked that "Were it not for obtaining news from Washington, especially the 1 a. m. weather-report, we could not take, as we do at considerable expense, the night-telegrams of the American Press Association."

PUBLICATIONS.

Number of Form 22 issued during the year ending September 30, 1874	56
Number of local reports issued during the year ending September 30, 1874	1,194
Total	1,250

INSTRUMENTS ON STATION.

Three standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

NEW LONDON, CONN.

[*Official number*, 14.]

Latitude	41° 22′
Longitude	72° 9′
Mean barometer for year ending September 30, 1874	30 039
Mean temperature for year ending September 30, 1874	47°.7
Amount of rain-fall for year ending September 30, 1874	65.35 inches.

The office was moved December 1, 1863, to the upper floor of the custom-house, and is admirably located, being three squares from the

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telegraph-office and four from the post-office. The roof of the building affords a good exposure for the display of cautionary signals. Sergt. T. O'Neill was in charge until June 29, 1874, when he was relieved and succeeded by Sergt. Geo. H. Crane, who still remains. All reports have been regularly and promptly made. There is one assistant at the station, who has been on duty during the whole year, and is reported to be a competent, reliable man. The station has been twice inspected during the year, and found in excellent condition on both occasions. Thirty-two cautionary signals have been displayed, of which twenty are reported as wholly verified and two partially verified. This station is on the New York and Eastport circuit, and receives five reports morning and afternoon and twenty-five at midnight.

PUBLICATIONS.

Number of bulletins issued during year ending September 30, 1874	6,545
Number of Form 15 (manifold) issued during year ending September 30, 1874	3,945
Number of Form 22 (manifold) issued during year ending September 30 1874	39
Total	10,529

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, two standard water-thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

NEW ORLEANS, LA.

[*Official number*, 28.]

Latitude	29° 58′
Longitude	90° 07′
Mean barometer for the year ending September 30, 1874	30.073
Mean temperature for the year ending September 30, 1874	69°.5
Amount of rain-fall for the year ending September 30, 1874	67.98 inches.

The office remains in the custom-house. Sergt. Nelson Gorom continues in charge, and has given satisfaction by the regularity and accuracy of his reports. One assistant was called in, November, 1873, for promotion. One was relieved in January, 1874, for misconduct, and another in May, 1874, for discharge. There are now three assistants on duty, one of whom is a printer charged with the issue of farmers' bulletins.

The station was inspected in January, 1874, and found in good condition.

Six cautionary signals have been displayed, of which number three are reported as verified at the station.

Reports from fifteen stations are received each morning and midnight, and from twenty-eight stations each afternoon. In addition to these, reports are received from all the special river-stations during the season of high water.

The sergeant reports as follows:

The interest hitherto manifested in our reports continues to increase.

The addition of the eastern circuit, by which reports are received from the several stations throughout the cotton-growing regions, has been very favorably received by the cotton-brokers and those interested in the cotton-traffic. A lively interest is still manifested by that portion of our shipping community who navigate the Mississippi and its tributaries. Especially was this interest heightened during the high water of

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the river last spring, when the importance of the knowledge of a rise or fall of an inch became general among the people of this State.

The river attained its highest recorded height on April 15 and 16, when it was six-tenths of a foot above high-water mark of 1871.

PUBLICATIONS.

Number of farmers' bulletins issued during the year ending September 30, 1874	18,690
Number of bulletins issued during the year ending September 30, 1874	11,564
Number of Form 26 issued during the year ending September 30, 1874	6,602
Number of Form 22 issued during the year ending September 30, 1874	53
Total	36,909

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-registerfor anemometer, two standard rain-gauges, one standard wind-vane.

NEW YORK CITY.

[*Official number*, 15.]

Latitude	40° 42′ 43″
Longitude	74° 00′ 03″
Mean barometer for year ending September 30, 1874	30.048
Mean temperature for year ending September 30, 1874	51°.4
Amount of rain-fall for year ending September 30, 1874	42.63 inches.

The location of the office at this station has not been changed since the date of last report. Sergt. C. R. Estabrook was in charge until January 29, 1874, when he was discharged at his own request. He was succeeded by Sergt. H. E. Cole, who still remains and attends to his various duties in a highly satisfactory manner. Sergt. M. F. Tighe is the senior assistant on duty, and has been conspicuously zealous in the performance of his duties. There are five other assistants on duty at present, of whom three are printers, charged with the issue of weather-maps and farmers' bulletins. Two assistants have been relieved during the year for misconduct, one for discharge, and five transferred to other stations. Six hundred and thirty-seven post-offices are furnished daily, except Sundays' with the farmers' bulletins, and the weather-maps have a large local circulation. They are now printed and distributed wholly by the office force, and the result is much more satisfactory than when other parties had charge of this duty.

The station was inspected in November, 1873, and in March, 1874, and on both occasions was found in excellent condition. Sergeant Estabrook left the service with an enviable reputation for faithfulness and zeal in the discharge of his official duties, and his successor has been equally fortunate in establishing such a reputation during the time he has been in charge. Thirty cautionary signals have been displayed, of which number twenty-one are reported as fully verified at the station. A large signal-lantern has been erected on the roof of the observatory building since last report, which shows a light visible from all parts of the harbor. It is lighted by electricity, which obviates the necessity of personal exposure on the roof for that purpose.

PUBLICATIONS.

Number of farmers' bulletins issued during year ending September 30, 1874	378,900
Number of maps issued during year ending September 30, 1874	87,294
Number of bulletins issued during year ending September 30, 1874	7,306
Number of Form 26 issued during year ending September 30, 1874	653
Number of Form 22 issued during year ending September 30, 1874	56
Total	474,214

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INSTRUMENTS ON STATION.

Two standard barometers, three standard thermometers, two standard minimum thermometers, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, two standard anemometers, one double self-register for anemometer and anemoscope, one standard wind-vane, two standard rain-gauges.

NORFOLK, VA.

[*Official number*, 30.]

Latitude	36° 51′
Longitude	76° 19′
Mean barometer for year ending September 30, 1874	30.087
Mean temperature for year ending September 30, 1874	58°.4
Amount of rain-fall for year ending September 30, 1874	55.27 inches.

No change has been made in the location of the office, nor is any considered desirable at present. Sergt. E. W. McGann remains in charge, and has rendered all reports promptly. He is a fair telegraph-operator, and has given general satisfaction in his management of the station.

One assistant has been called in for promotion, three for misconduct, and one for discharge during the year.

Two assistants are required on account of the additional work imposed by the construction of the telegraph-line to Cape Hatteras.

Until September 1, 1874, the station formed the northern terminus of that line, and all telegrams were necessarily transferred here; since that date it has become a way-station merely on the circuit, but the men are required to practice several hours daily upon the line in addition to their regular station-duties. The station was inspected in December, 1873, and found in fair condition. Several irregularities were noted and corrected by the inspector.

All reports passing over the New York and Savannah circuit are received here, in addition to the reports from Cape Henry and Cape Hatteras, but only the local observations are printed in the newspapers.

Twenty-five cautionary signals have been displayed, of which nineteen are reported as fully verified, and two partly verified at the station.

Of storm of October 6, 7, and 8, 1873, the sergeant remarks, "Storm severe; the extent of the injury is not known; fourteen vessels have put in here disabled, having lost their anchors, masts, sails, &c.;" and of storm of October 27, 1873, "The Baltimore steamer while crossing to Portsmouth was so unmanageable on account of the high wind, that she ran several feet into her wharf. Three vessels delayed their departures;" and of storm of January 7 and 8, 1874, "Baltimore steamer unable to land at Old Point. No vessels attempted to leave during the display of signals;" and of storm of February 9 and 10, 1874, "No vessels left port during the display. A large number of vessels were driven into Hampton Roads on account of the violence of the storm outside." Of storm of March 31 and April 1 and 2, 1874, he reports: "This signal was fully justified; a heavy gale outside. A fleet of 200 sailing-vessels put into Hampton Roads and remained there until the signal was lowered."

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	2,936
Number of maps issued during the year ending September 30, 1874	1,421
Number of press-reports issued during the year ending September 30, 1874	740
Number of local reports issued during the year ending September 30, 1874	130
Number of Form 15 (manifold) issued during the year ending September 30, 1874	2,614
Number of Form 22 issued during the year ending September 30, 1874	33
Total	7,874

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INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

NORTH PLATTE, NEB.

[*Official number*, 105.]

Latitude	41° 8′ ?
Longitude	100° 53′ ?
Elevation of barometer above sea-level	2,846 feet.

This station was established by Corp. John R. Williams, (since promoted to sergeant,) and reports began September 18, 1864, being sent over the San Francisco and Chicago circuit, on which it is located.

The office is in the school-building, a fine structure recently completed, and is furnished free of rent through the liberality of the citizens, represented by the board of school directors. At present, access to the roof cannot be had, and the vane and anemometer are exposed temporarily on staffs near the building. The instrument-shelter is of the standard pattern, and the exposure a good one.

Sergeant Williams has received every courtesy from the citizens in establishing the station, and the thanks of the office are due them for their assistance. Sergeant Williams is a good telegraph-operator and a competent observer.

INSTRUMENTS ON STATIONS.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one small wind-vane, one standard rain-gauge.

OMAHA, NEB.

[*Official number*, 67.]

Latitude	41° 16′
Longitude	96° 00′
Mean barometer for year ending September 30, 1874	29.978
Mean temperature for year ending September 30, 1874	49°.7
Amount of rain-fall for year ending September 30, 1874	25.65 inches.

The office remains at the corner of Thirteenth and Farnam streets, and Sergt. Thomas Cleary continues in charge, with the same assistant who was on duty at date of last report. Both men are favorably mentioned by the inspecting officer, who visited the station in June, 1874, when it was found in excellent condition. Sergeant Cleary is a fair telegraph-operator. All reports have been forwarded regularly and promptly and in good form. Reports passing over the Chicago and San Francisco circuit are received here, and selections from them published in the local press.

The sergeant remarks in his semi-annual report that "Among those most interested in the reports are the commission-merchants, who receive and make consignments of game, fish, &c., in the cold months, when merchandise of the kind would be liable to injury by mild weather during transportation; also the railroad companies, who frequently send to this office for records of the weather for past months, in order to settle difficulties arising from delays and damage to freight in shipment, when such injuries are imputed to the weather."

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PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	8,005
Number of Form 22 issued during the year ending September 30, 1874	44
Total	8,049

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard maximum thermometer, one standard minimum thermometer, one standard water-thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

OSWEGO, N. Y.

[*Official number*, 31.]

Latitude	42° 28′
Longitude	76° 35′
Mean barometer for year ending September 30, 1874	30.014
Mean temperature for year ending September 30, 1874	46°.5
Amount of rain-fall for year ending September 30, 1874	41.22 inches.

No change has been made in location of office during the year. Sergt. B. F. Hough still continues in charge of station. Two assistants have been relieved during the year for misconduct. The present assistant has been on duty since March 31, 1874, and is favorably mentioned by the sergeant. The station was inspected in July, 1874, and was found in excellent condition. Sergeant Hough has been on duty here since the establishment of the station, and is officially commended by the chairman of the meteorological committee of the board of trade for the attentive and intelligent manner in which he has performed his duties. Nineteen cautionary signals have been displayed, of which eleven have been reported as verified at the station.

Referring to storm of October 20 and 21, 1873, the sergeant remarks: "One vessel left port before signal was displayed, and was obliged to return. One schooner was driven ashore in trying to make this harbor, and was, together with her cargo, an entire loss."

The inspecting officer reports that it is a general practice for the captains of vessels engaged in the lake-trade to consult the office records before leaving port.

PUBLICATIONS.

Number of maps issued during the year ending September 30, 1874	3,824
Number of bulletins issued during the year ending September 30, 1874	5,132
Number of press-reports issued during the year ending September 30, 1874	658
Number of local reports issued during the year ending September 30, 1874	624
Number of Form 22 issued during the year ending September 30, 1874	46
Total	10,284

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, two standard hygrometers, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

PECK'S BEACH, N. J.

[*Official number*, 117.]

Latitude	39° 11′
Longitude	74° 41′
Elevation of barometer above sea-level	20 feet.

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The station was established December 10, 1873, by Sergt. John O. Barnes, who still remains in charge, and has given satisfaction. He has had an assistant since April 6, 1874. Both men are fair telegraph-operators. The office is located in the southern end of the life-saving building. The instrument shelter is of the standard portable form, and is fastened to the northeast end of the building, 1½ feet from the ground. The anemometer and wind-vane are placed on poles set in the ground. All the instruments are well exposed. The station is provided with a complete set of International signals, and the men are fully instructed in their use. The station is connected by telegraph, built by the Signal-Service, with the Western Union office at Seaville, and regular reports are sent, as from all the sea-coast stations. It will soon be placed in the same circuit with the other stations on the New Jersey coast, and report direct to the central office. The station was inspected in March, 1874, and found in excellent condition, so far as the work of the men was concerned. Communication with the mainland by telegraph is unreliable in winter, owing to the large masses of ice that drift through the small inlets between the beach and the main land. Sixteen cautionary signals have been displayed, of which ten are reported as fully verified at the station.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one standard rain-gauge, one small wind-vane.

PEMBINA, DAK.

[*Official number*, 86.]

Latitude	49° 00′
Longitude	97° 05′
Mean barometer for year ending September 30, 1874	29.967
Mean temperature for year ending September 30, 1874	34°.3
Amount of rain-fall for year ending September 30, 1874	12.79 inches.

No change has been made in the location of office and instruments since last report.

Sergt. Sidney Powell still remains in charge. Reports were made with regularity until the first of September, since which date those by mail have been interrupted, although the telegraphic ones have been received whenever the line was working.

The station was inspected in May, 1874, and found in good condition.

Sergeant Powell is a fair telegraph-operator, and sends his own reports.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, two standard minimum thermometers, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one small wind-vane, one standard rain-gauge.

PITTSBURGH, PA.

[*Official number*, 41.]

Latitude	40° 32′
Longitude	80° 02′
Mean barometer for year ending September 30, 1874	30.017
Mean temperature for year ending September 30, 1874	52°.6
Amount of rain-fall for year ending September 30, 1874	44.26 inches.

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The office remains in the First National Bank building, and is well located. Sergt. James B. Murray was relieved December 23, 1873, and succeeded by Sergt. D. O'Leary, who was in turn relieved February 28, 1874, by Sergt. George H. Rohe, who remains and gives full satisfaction. There are three assistants at present on duty, of whom two are printers, charged with the issue of the farmers' bulletins, which are supplied to 313 post-offices daily, except Sundays. All the men now on duty are hard-working and faithful. One assistant has been called in for promotion during the year, and three for misconduct. The station was inspected in December, 1873, and found in such bad condition that the sergeant in charge was at once relieved and reduced to the rank of a private soldier for neglect of duty. All reports passing over the Cincinnati and Washington circuit are received here, and published daily in the several newspapers.

PUBLICATIONS.

Number of farmers' bulletins issued during the year ending September 30, 1874	185,822
Number of bulletins issued during the year ending September 30, 1874	9,484
Number of Form 22 issued during the year ending September 30, 1874	90
Number of Form 26 issued during the year ending September 30, 1874	2,650
Total	198,046

INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, two standard water-thermometers, one standard anemometer, one standard hygrometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

PIKE'S PEAK, COLO.

[*Official number*, 99.]

Latitude	38° 48′
Longitude	104° 59′

Sergt. George Boehmer was relieved from charge of this station October 20, 1873, for gross mismanagement, and succeeded by Sergt. Robert Seyboth, who remained until September 12, 1874, when he was relieved at his own request on account of ill-health caused by exposure, and transferred to another station where the work was less arduous. Sergt. William Phoedovius, his senior assistant, was promoted to the grade of sergeant and placed in charge of the station. Five assistants have been relieved during the year and assigned to duty elsewhere. Two assistants are now on the station, and will probably remain until next spring if the state of their health permits. All reports by mail have been regularly forwarded, and all by telegraph as regularly as the communication allowed. Sergeant Seyboth discharged his duties at this isolated station in the most satisfactory manner. The station was inspected in June, 1874, and found in good condition. As the house built for the men on the summit was found too small for their accommodation and the storage of necessary supplies, an addition has been made to it, and the condition of the men will be much more comfortable the ensuing winter than it was last season. The telegraph-line has been put in good repair, and it is hoped that communication will be maintained regularly hereafter between the summit and base. Full details of the daily life of the men on this station are given in the extracts from Sergeant Seyboth's journal, paper 6.

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INSTRUMENTS ON STATION.

Three standard barometers, one standard thermometer, two standard minimum thermometers, two standard maximum thermometers, three standard hygrometers, four standard anemometers, one standard rain-gauge, one small wind-vane.

PHILADELPHIA, PA.

[*Official number*, 17.]

Latitude	39° 57
Longitude	75° 10′
Mean barometer for year ending September 30, 1874	30.067
Mean temperature for year ending September 30, 1874	52°.5
Amount of rain-fall for year ending September 30, 1874	49.32 inches.

The office is located in the same building as at the date of last report, and is in the business heart of the city. A printing-room has been added on the ground floor of the building, which greatly increases the facilities for performing the station work, especially at night.

Sergt. W. T. Boyd was in charge until transferred to another station, September 12, 1874. He was succeeded by Sergt. Robert Seyboth, transferred here from Pike's Peak; Sergt. E. W. Boutelle is the senior assistant on duty, and was in temporary charge of station from the time Sergeant Boyd left until the arrival of his successor.

Two assistants have been called in for promotion during the year, seven relieved for misconduct, and one transferred to the central office. The station has been especially unfortunate in its assistants up to this date. There are six assistants now on duty, of whom two are printers, charged with the issue of maps and farmers' bulletins.

The issue of the bulletins began July 1, 1874, and 479 post-offices are supplied regularly. The station was inspected in September, 1874, and found in fair condition. Speaking of the sergeants on duty, the inspector remarks:

> Sergeant Boyd appears to have been very attentive to his office-work, but has evidently neglected the outside work. Sergeant Boutelle has attended to his work carefully and faithfully.

This is a telegraph-station, being on the line connecting the central office with the New Jersey coast, and two men are required to attend to this part of the work. 190 maps are printed daily, and distributed by a messenger employed by the Marine Board of Underwriters.

All reports passing over the New York and Savannah circuit are received here and bulletined in the usual manner. The local observations are published weekly by the Board of Health in excellent form.

PUBLICATIONS.

Number of maps issued during the year ending September 30, 1874	58,580
Number of farmers' bulletins issued during the year ending September 30, 1874	89,900
Number of bulletins issued during the year ending September 30, 1874	9,464
Number of press-reports issued during the year ending September 30, 1874	147
Number of local reports issued during the year ending September 30, 1874	27
Number of Form 15 (manifold) issued during the year ending September 30, 1874	4,027
Number of Form 22 issued during the year ending September 30, 1874	127
Number of Form 26 issued during the year ending September 30, 1874	156
Total	162,428

INSTRUMENTS ON STATION.

Three standard barometers, two standard thermometers, four standard minimum thermometers, one standard maximum thermometer, one

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standard water-thermometer, one hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one small wind-vane.

PORT HURON, MICH.

[*Official number*, 103.]

Latitude	42° 58′
Longitude	82° 29′
Elevation of barometer above sea-level	630 feet.

The station was established July 14, 1874, by Sergt. N. D. Lane, who began reporting July 25, since which date there has been no interruption in the reports. The office is located in the southwest corner of the second story of the city-hall, and is within easy reach of the telegraph and post-offices and the principal business houses. The instrument-shelter is of the standard pattern, and is in the tower of the city-hall. The exposure for anemometer and wind-vane on the building is fair, and that of the rain-gauge good. Free use of the office-rooms and other required facilities is given by the city council. Cautionary signals are displayed from the staff on the city-hall, and are visible from all parts of the harbor. One signal only has been ordered here since the station was opened, and that is reported as fully verified. Reports from all lake stations are received here and published in the usual manner. The local press devotes a liberal amount of space to the service, and prints the reports in excellent form. There is one assistant on duty, and one has been found necessary at all cautionary stations, owing to the length of time that the office is held open daily.

INSTRUMENTS ON STATION.

One standard barometer, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one standard rain-gauge, one standard wind-vane.

PORTLAND, ME.

[*Official number*, 12.]

Latitude	43° 40′
Longitude	70° 14′
Mean barometer for the year ending September 30, 1874	29 942
Mean temperature for year ending September 30, 1874	44°.2
Amount of rain-fall for year ending September 30, 1874	42.23 inches.

The office was removed September 30, 1873, to Boyd's Block, corner of Middle and Exchange streets, and is located on the third floor.

Sergt. A. B. Williams was in charge until August 29, 1874, when he was called in for discharge, and succeeded by Sergt. A. R. Thornett, who still remains in charge. One assistant has been ordered in for promotion during the year; another instructed man was sent to replace him, and still remains.

The station was inspected in the latter part of February, 1874, and found in fair condition only. Since February 4, 1874, reports from five other stations are received here in the morning and afternoon, and from twenty-five at midnight.

Thirty-two cautionary signals have been displayed, of which twenty-five are reported as verified at the station.

Relative to the storm of October 7, 1873, the sergeant remarks: "No damage reported, but the heaviest sea known for years." Of storm of

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October 20 and 21, 1873: "New York and Boston steamers remained in. Saint John's steamer, coming to this place, encountered gale and was damaged." Of storm of November 17, 18, and 19, 1873: "Steamers and vessels remained in; those at sea sustained considerable damage; one of the severest storms at sea for years." Of the storm of April 29, 30, and May 1, 1874: "Schooner H. A. Chase set sail while signals were flying, and sunk in sight of all, a short distance outside of harbor, with the loss of all hands."

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	3,729
Number of Form 25 (manifold) issued during the year ending September 30, 1874	805
Number of Form 22 issued during the year ending September 30, 1874	53
Total	4,587

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, two standard anemometers, one self-register to anemometer, one standard rain-gauge, one standard wind-vane.

PORTLAND, O.

[*Official number*, 74.]

Latitude	46° 30′
Longitude	122° 27′ 30″
Mean barometer for year ending September 30, 1874	30.083
Mean temperature for year ending September 30, 1874	52°.8
Amount of rain-fall for year ending September 30, 1864	43.69 inches.

The office was moved December 22, 1873, to its present location, at the southwest corner of Washington and Front streets. It is on the upper floor of a three-story building, with a good roof-exposure for the wind-vane and anemometer, and a northern exposure for the instrument-shelter. It is in the business portion of the city, near the public offices and buildings. Sergt. J. E. Evans remains in charge, with the same assistant who was on duty at last report. Both men are highly commended by the inspecting-officer, who visited the station in August, 1874. There has been occasional delay in forwarding mail reports, but the telegraphic ones have been sent promptly and regularly when the line was in working order. The sergeant reports as follows in reference to the interest manifested in the service: "The public interest in the service has increased greatly within the last year, as it is considered of great advantage to the State that three reports daily are telegraphed from this city and bulletined in all the eastern cities where stations are established, thereby giving the people of other States an opportunity to know that the climate of Oregon is mild, and does not have as much rain-fall as is generally supposed."

The inspector reports as follows on the condition of the station: "The office-rooms, instruments, books, records, &c., are in first-class condition. All records are up to date, letters properly indorsed and filed, circulars and orders clean, and neatly filed." The daily papers publish all local reports and the monthly means and weather review.

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INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, two standard minimum thermometers, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, two small wind-vanes.

PUNTA RASSA, FLA.

[*Official number*, 59.)

Latitude	26° 29′
Longitude	82° 10′
Mean barometer for year ending September 30, 1874	30°.087
Mean temperature for year ending September 30, 1874	73°.5
Amount of rain-fall for year ending September 30, 1874	44.45 inches.

No change has been made in the location of the office since date of last report. Sergt. M. J. Shanefelter remains in charge. All reports have been made satisfactorily and as promptly as the somewhat imperfect mail and telegraphic facilities would permit. Private E. K. Moore, who was on duty as assistant, died October 18, 1873, at Key West, where he had been sent for proper medical treatment. He was an intelligent, faithful man, steady in his habits, and prompt in the discharge of duty. The present assistant has been on duty since December 9, and has given satisfaction.

The following report of the cyclone of October 6 and 7, 1873, is given in the words of Sergeant Shanefelter:

During the afternoon of the 5th the barometer fell steadily and constantly, reaching 29.77 by midnight. Fresh, increasing to brisk winds from the east. Upper clouds hidden; lower stratus and nimbus moving rapidly with the surface-winds. On the 6th, barometer continued to fall rapidly, accompanied with four-quarter cirro-stratus clouds, moving slowly from the south.

Nimbus (scud-clouds) arose from the east after 8 a. m., moving rapidly with the surface-winds; light drizzly rain falling at short intervals; wind from the southeast and east, brisk velocity, and rapidly increasing to high. After 10 a. m., barometer began to fall more and more rapidly; upper clouds becoming hidden, scud-clouds, nimbus, and stratus flying very low and rapidly with the surface-winds; vane very unsteady; wind fluctuating between the points east and southeast, and rapidly increasing in velocity; drizzly rain continuing to fall at intervals.

After 4 p. m. heavy rain fell, (during ten minutes;) blowing at sixty-four miles per hour from the southeast, sweeping all before it; barometer 29.10, and falling with great rapidity; top part of anemometer blown off and disappeared; water 11 feet above mean tide; all land flooded, even the highest points; sea very rough, waves 10 feet high in harbor. Wind from the southeast and south, with velocity increasing to about seventy-five miles per hour, until about 8.45 p. m. Barometer 28.83 at 6.10 p. m., 28.63 at 7.15, 28.57 at 7.43, 28.43 at 8.25, and 28.40 at 8.45 p. m., when the wind lulled and barometer began to rise rapidly, very suddenly; wind north (having shifted by the west) at 9 p. m., and barometer having risen to 28.56. Suddenly, shortly after 9 p. m., began blowing from the northwest with fearful velocity, increasing to about ninety miles per hour, (and accompanied with heavy fall of rain during about fifteen minutes.)

After 11 p. m. began blowing more steady, and rain fell at longer intervals. Water 14 feet above mean tide at 9 p. m. Barometer still rising on the 7th, and wind decreasing in velocity, and a little drizzling rain falling at intervals. Began clearing up after 2.15 a. m. Sky almost entirely clear by 5 a. m.; wind brisk and from the northwest. At 6 a. m. wind from the north and fresh; fair but very cool, temperature having fallen to 66°.

DAMAGES.

Signal service: Total loss of two broken chairs, stove and fixtures, dipper, water-bucket, wash-basin, fire-shovel, wall-tent and fly, one-fourth ton of coal, cord of wood, ax and helve, hatchet and helve, lumber forming frame of wall-tent, and top part (cups and arms) of anemometer, all swept away by the sea.

Personal: Wearing-apparel, bed-clothes and provisions, valued at $100, swept away by the sea.

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Telegraph company: Wharf and cattle-pen swept away, cistern damaged; also building, amounting in all to $1,500.

Manager telegraph-office: Hogs and chickens drowned and wearing-apparel much damaged—$150.

Joseph Sawyer, (Punta Rassa:) Clothes, chickens, and small building lost—$150.

Señor Antonio, (Punta Rassa:) Clothes, provisions, small building, and other articles lost; also boat damaged—$300.

Smack Minnie, with cargo of fish, ashore near El Esterro River, six miles from Punta Rassa; can be got off. Damages: Mast cut out, fish entire loss—$2,000.

El Esterro fishery entirely destroyed—$1,000.

Small-boat (name unknown) capsized and lost, crew saved, two miles from Punta Rassa—$700.

Schooner Beauregard high and dry ashore on Sinabel Island, two and a quarter miles southwest from Punta Rassa; can be got off—$500. Not injured.

Steamer Huntress sunk by Sinabel Island, two and a quarter miles southwest from Punta Rassa. Total loss, with cargo aboard—$30,000.

Dr. Hunter, Sinabel Island: Loss of buildings, lumber, provisions, boats, &c.—$75,000.

Captivo, Punctillio-Blanco, and Gasparral fisheries. Total loss, $3,000.

The United States revenue-cutter Northern was at Punta Rassa during the whole of the cyclone, had four anchors out, and kept full head of steam. Not damaged; stood it splendidly, but tried her very much. No lives known to be lost about here. Several houses blown down at Fort Myers.

The station was inspected in January, 1874, and found in excellent condition so far as records and men were concerned.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

ROCHESTER, N. Y.

[*Official number*, 32.]

Latitude	43° 08′
Longitude	77° 51′
Mean barometer for the year ending September 30, 1874	29.991
Mean temperature for the year ending September 30, 1874	46°.5
Amount of rain-fall for the year ending September 30, 1874	47.17 inches.

The office still remains in Power's Block, and is satisfactorily located. Sergt. F. M. M. Beall was in charge of station until August 17, 1874, when he was transferred to the central office and succeeded by Sergt. L. E. Sebree. Both sergeants have given satisfaction by the promptness and regularity of their reports. One assistant was called in for promotion during the year. At present there are two assistants on duty, the work having recently been found too arduous for a single one. The station was inspected in July, 1874, and everything found in excellent condition, the instruments being in good order and well cared for, the reports, &c., also being well kept up, and posted in a very prompt manner. Nineteen cautionary signals have been displayed, of which fourteen are reported as verified at the station. Of one of the storms for which signals were displayed, that of October 20, 1870, the sergeant remarks:

The storm was accompanied by a heavy rain and northerly wind, making it very dangerous for south coastwise vessels, of which a number are reported wrecked. Rain-storm lasted sixty and a half hours.

During the past half-year the sergeant has been summoned before the different local courts with weather records to give information bear-

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ing on cases pending nine different times, and it has been considered that the information obtained from the records had more or less influence in the result of each case.

PUBLICATIONS.

Number of bulletins issued during year ending September 30, 1874	7,009
Number of press-reports issued during year ending September 30, 1874	1,388
Number of maps issued during year ending September 30, 1874	4,085
Number of Form 15 (manifold) issued during the year ending September 30, 1874	4,903
Number of Form 22 (manifold) issued during the year ending September 30, 1874	201
Total	17,586

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, two standard minimum thermometers, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

SALT LAKE CITY, UTAH.

[*Official number*, 70.]

Latitude	41° 10′
Longitude	112° 00′
Elevation of barometer above sea-level	4,350 feet.

The station was established March 19, 1874, by Sergt. S. W. Beall, and took the place of Corinne station, abandoned on that date.

The office is located at the southeast corner of East Temple and First South streets, on the upper floor of the building. The roof-exposure for instruments is a good one, and the instrument-shelter is well built and properly placed.

The rod of the wind-vane passes through the roof and registers on the ceiling of the office. Sergeant Beall was transferred to another station June 30, 1874, and succeeded by Sergt. W. B. Webster, who still remains. One assistant has been called in during the year for promotion. The present assistant is favorably mentioned for attention to duty. The station was inspected in August, 1874, and found in fair condition.

All reports passing over the Chicago and San Francisco circuit are received here and published by the daily press.

PUBLICATIONS.

Number of bulletins issued from March 19, 1874, to September 30, 1874	620
Number of press-reports issued from March 19, 1874, to September 30, 1874	274
Number of Form 22 issued from March 19, 1874, to September 30, 1874	21
Number of local reports issued from March 19, 1874, to September 30, 1874	77
Total	992

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one small wind-vane.

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SAN DIEGO, CAL.

[*Official number*, 75.]

Latitude	32° 44′ 41″
Longitude	117° 08′ 00″
Mean barometer for the year ending September 30, 1874	30.017
Mean temperature for the year ending September 30, 1874	59°.9
Amount of rain-fall for the year ending September 30, 1874	15.10 inches.

No change has been made in the location of office since last report, and Sergt. J. B. Wells continues in charge. All reports have been made regularly and satisfactorily. Owing to the ill-health of Sergeant Wells it was found necessary in March, 1874, to send an assistant to the station to guard against any interruption of the reports. The station was inspected in September, 1874, and found in excellent condition. The citizens manifest considerable interest in the working of the office, and the daily newspapers print the local reports in full.

PUBLICATIONS.

Number of press-reports issued during the year ending September 30, 1874	804
Number of local reports issued during the year ending September 30, 1874	346
Number of Form 22 issued during the year ending September 30, 1874	12
Total	1,162

INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, two standard rain-gauges.

SANDY HOOK, N. J.

[*Official number*, 112.]

Latitude	40° 28′
Longitude	74° 01′
Elevation of barometer above sea-level	23 feet.

The station was established December 10, 1873, by Sergt. John R. Williams, who remained in charge until July 20, 1874, when he was succeeded by Sergt. J. J. Nanry. One assistant was called in for reported misconduct September 2, 1874, and another man sent to replace him Both men on duty are fair telegraph-operators.

The office was located in Life-Saving Station No. 1 until May 29, when it was removed to a more desirable position in the building of the Engineer Corps, formerly occupied by the commanding-officer of the forces employed in constructing a fort at that point, where the exposure for instruments and the facilities for displaying signals are greatly improved.

The station is supplied with a complete outfit for using International signals, and is in direct telegraph communication with the central office.

Eighteen cautionary signals have been displayed during the year, of which number twelve are reported as fully verified at the station. The station was inspected in March, 1874, before its removal from its original location, and found in good condition, so far as the office records and internal management were concerned.

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INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one small wind-vane, one standard rain-gauge.

SAN FRANCISCO, CAL.

[*Official number*, 29.]

Latitude	37° 47′ 35″
Longitude	122° 26′ 15″
Mean barometer for the year ending September 30, 1874	30.022
Mean temperature for the year ending September 30, 1874	55°.5
Amount of rain-fall for the year ending September 30, 1874	24.67 inches.

The location of the office remains as at last report, and cannot well be improved. Sergt. W. B. Webster was in charge until transferred to another station, June 30, 1874, when he was succeeded by Sergt. S. W. Beall. No change has been made in the assistants during the year. All reports have been made regularly and satisfactorily. The station was inspected in August, 1874, and found in excellent condition. The only reports received here are those passing over the Chicago and San Francisco circuit, and only the local observations are published by the daily press.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	2,216
Number of Form 22 issued during the year ending September 30, 1874	46
Total	2,262

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, two standard rain-gauges.

SANTA FÉ, N. MEX.

[*Official number*, 69.]

Latitude	35° 41′
Longitude	106° 10′
Mean barometer for year ending September 30, 1874	29.772
Mean temperature for year ending September 30, 1874	48°.8
Amount of rain-fall for year ending September 30, 1874	15.80 inches.

No change has been made in the location of the office during the year. Sergt. John P. Clum was ordered in, December 15, 1873, for discharge, and was succeeded by Sergt. William McElroy, who still remains in charge. The mail-reports from this station have been forwarded with regularity since Sergeant McElroy assumed charge, but the telegraphic reports have been irregular, owing to frequent interruptions in the communication between Santa Fé and Pueblo. The station has not been inspected since last report.

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PUBLICATIONS.

Number of morning press-reports issued during the year ending September 30, 1874	221
Number of Form 22 issued during the year ending September 30, 1874	8
Total	229

INSTRUMENTS ON STATION.

Two standard barometers, three standard thermometers, three standard minimum thermometers, two standard maximum thermometers, one standard hygrometer, one standard anemometer, one self register for anemometer, one standard rain-gauge, one standard wind-vane.

SAVANNAH, GA.

[*Official number*, 22.]

Latitude	32° 05′
Longitude	81° 08′
Mean barometer for year ending September 30, 1874	30.106
Mean temperature for year ending September 30, 1874	65°.9
Amount of rain-fall for year ending September 30, 1874	63.14 inches.

The office remains at the corner of Bull and Bay streets, and the location could not be improved for the exposure of instruments and the display of signals. Sergt. J. O. Manson was transferred to another station February 25, 1874, and succeeded by Sergt. W. S. Popple, who continues in charge, and under whose energetic management the usefulness of the station has been largely increased. One assistant has been called in for promotion and one for misconduct during the year. Two assistants are now on duty, and are necessary for the proper performance of the station work. Sergeant Popple is a fair telegraph-operator. Reports from the Florida and West Indian stations are transferred here to the New York circuit, of which this station is the southern terminal. All reports passing over the circuit are received here, and published in creditable form by the newspapers. The station was inspected in December, 1873, and found in good condition. Six cautionary signals have been displayed, of which four are reported as fully verified at the station.

The sergeant reports that the committee appointed by the Chamber of Commerce has rendered valuable service in connection with the management of the station. They have also aided in many other important matters, which have tended to bring the station into intimate relations with the business circles of the place, which had not before then been the case. Since the 1st of May, 1874, reports from the Mississippi Valley have been received at this station. These reports were urgently sought for by, and furnished at the request of, the members of the Chamber of Commerce, the Cotton Exchange, and other leading and influential citizens of Savannah.

To further the shipping and mercantile interest by aiding in the display of cautionary signals, at the urgent request of leading merchants and shippers, the members of the Chamber of Commerce and Cotton Exchange, a station has recently been established at Tybee Island, eighteen miles down the river on the coast. This island being the point at which nearly all vessels for this port receive waiting and sailing orders, the importance of the station is great, and the community strongly approve of it, and say that it has largely increased the safety of their marine interests and added to the safety and value of their port.

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PUBLICATIONS.

Number of maps issued during year ending September 30, 1874	4,003
Number of bulletins issued during year ending September 30, 1874	6,950
Number of press-reports issued during year ending September 30, 1874	319
Number of local reports issued during year ending September 30, 1874	616
Number of Form 22 issued during year ending September 30, 1874	55
Total	11,943

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

SHREVEPORT, LA.

[*Official number*, 72.]

Latitude	32° 30′
Longitude	93° 45′
Mean barometer for year ending September 30, 1874	30.050
Mean temperature for year ending September 30, 1874	66°.2
Amount of rain-fall for year ending September 30, 1874	63.08 inches.

No change has been made during the year in the location of the office. Private J. G. Lynch was in charge of station alone from the death of Sergeant Coyle until November 24, 1873, when Sergt. James O'Dowd was assigned to the station. Private Lynch attended to the work faithfully and steadily, and all reports were promptly forwarded. Sergeant O'Dowd has been in poor health a portion of the time, and his reports in consequence have been delayed. Private Lynch was called in for promotion in July, and his successor was relieved for misconduct after a month's duty. The present assistant is favorably mentioned for attention to duty. The station was inspected in February, 1874, and found in fair condition. The river-gauge constructed last year has been washed away and is not yet replaced. Reports from other stations are not received here, but the local reports are regularly published in the local press.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard water-thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard rain-gauge, one small wind-vane.

SPRINGFIELD, MASS.

[*Official number*, 110.]

Corporal John G. Murray has remained in charge during the whole year, and performed his duties satisfactorily and promptly. Observations are not made at this station, the work being limited to the printing and distribution of farmers' bulletins. Eighty-six offices are supplied with two copies daily, except Sundays. Since last report 46,034 bulletins have been distributed. The Synopsis and Probabilities are received from Washington at 12.45 a. m., and the average time of mailing the printed copies has been 3.30 a. m. The office remains in the Republican building, and was inspected in February, 1874, and found in excellent condition.

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SQUAN BEACH, N. J.

[*Official number*, 114.]

Latitude	40° 08′
Longitude	74° 01′
Elevation of barometer above sea-level	23 feet.

The station was established, December 10, 1873, by Sergt. D. M. Kennedy, who still remains in charge, with one assistant. Both men are fair telegraph-operators, and thoroughly competent to perform their duties. One assistant was relieved in July, for misconduct. The office is on the second floor of the life-saving station, and is of the same general character as at the stations on the coast already described. The instrument-shelter is of the standard portable pattern and elevated four feet from the ground. The anemometer and wind-vane are on poles erected near the building and well exposed. A complete set of International signal-flags is at the station, and the men are instructed in their use. Ten cautionary signals have been displayed, of which eight are reported as verified at the station. The office is in direct telegraphic communication over the signal-line with the central office, and reports regularly all passing shipping and all disasters to vessels in addition to the usual meteorological observations. The station was inspected in March, 1874, and found in good condition.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one small wind-vane, one standard rain-gauge.

SAINT LOUIS, MO.

[*Official number*, 66.]

Latitude	38° 37′ 28″
Longitude	90° 15′ 16″
Mean barometer for year ending September 30, 1874	30.050
Mean temperature for year ending September 30, 1874	56°.1
Amount of rain-fall for year ending September 30, 1874	42.93 inches.

The office remains in the building of the Saint Louis Life-Insurance Company, at the corner of Sixth and Locust streets, and is admirably located.

Two rooms are occupied, one as an office and the other as a printing-room, the latter being furnished free of cost by the insurance company. Sergt. E. H. Singleton was relieved from charge of the station October 2, 1873, and succeeded by Sergt. W. O. Bailey, who had been on duty as senior assistant for some months previously. He was transferred to another station January 29, 1874, and Sergt. S. S. Bassler left in charge until May 27, 1874, when he was relieved for irregular conduct, and succeeded by Sergt. George Prender, who still remains and manages the station satisfactorily.

Numerous changes in the assistants have been made during the year for various reasons, but it is believed that the present force is composed of steady, reliable men. One assistant has been called in for promotion, four transferred to duty elsewhere, two called in for discharge, and three relieved for misconduct. At present there are six assistants on

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duty, and complaint is made that the amount of work done is too great for this force. Three of the men are printers, charged with the issue of maps and farmers' bulletins; 468 post-offices are supplied daily with the bulletins, and the maps are distributed to most of the prominent public places in the city. Corporal Fleming is the senior assistant. The station was inspected in March, 1874, and again in September, 1874. At the first inspection matters were found in a very unsatisfactory condition, and several changes in the working-force were made with good results. At the second inspection, the officer reports very favorably of the appearance of the office and records, and compliments Sergeant Prender for his zeal and general attention to duty. His monthly reports to the central office have been made out with especial care and neatness. Referring to the public interest in the working of the office, the sergeant says:

All classes of people in this city appear to be deeply interested in the work of the signal service, and business men are more or less governed by the daily predictions.

Tourists include this office among the places worthy of inspection and examination; strangers of note frequently call; pleasure parties appoint committees to consult the observer; parents bring their sons here to receive their first instructions in meteorology; scientific gentlemen compare their observations with the official records. Indirectly the value of property is determined here, for no important sale occurs until the signal-office is consulted in regard to the weather. Invalids needing the invigorating influence of the open air ask advice. To insurance agents the probabilities and bulletins are indispensable. Parties contemplating a change of residence hasten or postpone the transfer of goods in the faith of the Signal Bureau.

Through the instrumentality of this service the artist determines in advance his patronage and profits; the hearts of the little ones pic-nic bent beat high or low; none are free from its influence.

The daily newspapers devote a liberal amount of space to the publication of reports daily and monthly, and give them in excellent form. All reports passing over the Chicago and Cincinnati circuit are received here, and those from stations to the west and southwest are transferred to the central office.

PUBLICATIONS.

Number of farmers' bulletins issued during the year ending September 30, 1874	413,342
Number of bulletins issued during the year ending September 30, 1874	12,037
Number of maps issued during the year ending September 30, 1874	53,731
Number of local reports issued during the year ending September 30, 1874	927
Number of Form 22 issued during the year ending September 30, 1874	318
Number of Form 26 issued during the year ending September 30, 1874	3,106
Total	483,461

INSTRUMENTS ON STATION.

Two standard barometers, one standard thermometer, one standard maximum thermometer, one standard minimum thermometer, two standard water thermometers, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

SAINT MICHAELS, ALASKA.

[*Official number*, 119.]

Latitude	63° 48′
Longitude	162° 10′

Private Lucien M. Turner was ordered, March 18, 1874, to proceed to this point to open a station of observation. He left San Francisco in April, fully provided with all necessary instruments and other supplies. He reports his arrival here on May 25, after a passage of 38 days from

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San Francisco, with all instruments in good condition except one barometer, which was accidently broken. An instrument-shelter has been constructed as nearly of the standard pattern as the facilities of the place would allow, and the anemometer, wind-vane, and rain-gauge are well exposed.

Detailed reports from this station cannot be received until the summer of 1875.

In addition to meteorological observations, Private Turner is instructed to make a collection of specimens in natural history for scientific purposes.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, three standard minimum thermometers, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one standard rain-gauge.

SAINT PAUL'S ISLAND, ALASKA.

[*Official number*, 120.]

Latitude	57° 38′
Longitude	169° 50′
Elevation of barometer above sea-level	unknown.

Private C. P. Fish remains in charge, and his full reports to July 4, 1874, have been received at the central office. As he can only communicate once a year, the amount of material requires more time for examination and discussion than has elapsed since its receipt. The following abstract of the records from June 1, 1873, to May 30, 1874, contains the leading facts, and will be interesting as an authentic exhibit of the climate of Behring's Sea:

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Abstract of meteorological records for the months from June, 1873, to May, 1874, inclusive.

ISLAND OF SAINT PAUL, BEHRING SEA.

Month of record.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.
Mean of barometer corrected	29.814	29.934	29.894	29.588	29.326	29.492	29.442	29.546	29.734	29.862	29.702	29.735
Maximum of barometer	30.25	30.18	30.22	30.15	30.19	30.24	30.35	30.86	30.64	30.50	30.18	30.24
Minimum of barometer	29.33	29.35	28.89	28.94	28.30	28.62	28.61	28.62	28.83	28.91	29.20	28.68
Monthly range of barometer	.92	.83	1.33	1.21	1.89	1.62	1.74	2.24	1.81	1.59	.98	1.56
Greatest daily range of barometer	.51	.45	.97	.63	.97	.64	1.08	.63	.94	.94	.53	.71
Least daily range of barometer	.02	.03	.03	.02	.02	.02	.08	.08	.06	.04	.95	.04
Mean daily range of barometer	.147	.152	.204	.235	.305	.253	.399	.263	.348	.296	.189	.198
Mean of exposed thermometer	37°.47	42°.98	46°.55	43°.05	37°.85	32°.37	29°.95	29°.86	33°.55	33°	34°.51	38°.96
Maximum of thermometer	47°	52°	55°	49°	46°	41°	40°	37°	40°	42°	45°	52°
Minimum of thermometer	28°	36°	39°	35°	31°	23°	12°	8°	19°	19°	21°	25°
Monthly range of thermometer	19°	16°	16°	14°	15°	18°	28°	29°	21°	23°	24°	27°
Mean on warmest day of thermometer	42°	46°	49°	46°	43°.5	39°	38°.5	35°	38°	38°.5	40°	45°
Mean on coldest day of thermometer	33°	39°	42°	39°	33°	26°	15°	16°	25°	24°.5	24°.5	31°
Greatest daily range of thermometer	16°	13°	12°	9°	10°	11°	19°	19°	15°	16°	11°	14°
Least daily range of thermometer	3°	3°	2°	2°	1°	1°	1°	1°	2°	2°	1°	3°
Mean of maxima of thermometer	41°.50	46°.13	49°.61	45°.60	39°.9	34°.37	33°.55	32°.94	35°.57	35°.74	37°.63	43°.61
Mean of minima of thermometer	33°	39°.68	43°.32	40°.50	35°.8	30°.37	26°.35	26°.77	31°.54	30°.26	31°.40	35°.06
Mean daily range of thermometer	8°.5	6°.45	6°.29	5°.10	4°.1	4°.00	7°.20	6°.17	4°.03	5°.48	6°.23	8°.55
Mean relative humidity	87.06	89.81	89.44	89.04	84.51	86.57	83.47	86.95	87.37	84.04	89.39	77.41
Maximum relative humidity	100.	100.	96.	100.	95.	100.	.95	100.	100.	100.	94.	91.
Minimum relative humidity	67.	75.	67.	65.	61.	68.	55	68.	68.	68.	52.	53.
Prevailing wind	E.	S.	S.	S. E.	N. W.	N.	S.	E.	S.	W.	S. E.	N. E.
Number of miles traveled by wind	14.387	11.587	12.075	11.055	15.010	12.972	16.998	15.174	11.251	13.303	11.047	8.450
Mean daily velocity of wind	47.96	373.8	389.5	368.5	484.2	432.4	548.3	489.5	401.8	429.1	368.2	352.1
Mean hourly velocity of wind	19.98	15.57	16.23	15.35	20.17	18.02	22.85	20.40	16.70	17.88	15.34	11.36
Maximum hourly velocity of wind	40	46	62	76	77	61	71	54	53	46	42	38
Proportion of cloudiness, (Form 4)	86.9	96.4	95.2	83.1	89.9	82.9	82.3	83.78	80.5	83.2	83.6	76.1
Proportion of fog	26.7	50.2	48.9	20.5	8.1	9.4	0.	2.5	12.8	9.6	2.8	12.1
Prevailing cloud, (not including fog:)	June, cirrus stratus;	July, cirrus compounds;	August, cirrus compounds;	September, cumulus;	October, cirrus compounds;	November, cumulus;	December, cirrus compounds;	January, cirrus;	February, cirrus compounds;	March, cirrus;	April, cumulus;	May, cumulus.
Amount rain-fall in inches	0.50	2.65	2.61	2.64	3.89	3.61	5.60	3.23	5.33	3.06	.84	.58
Greatest daily amount rain-fall	.24	.78	.67	.44	.86	.53	1.15	.84	1.26	.47	.31	.15
Amount melted hail and snow, (included in rainfall)	.15	.00	.00	.00	.62	2.16	3.12	2.03	2.84	1.52	.65	.34
Number of days on which precipitation occurred	21	25	26	27	31	30	30	31	28	30	29	21
Number of days on which rain fell	15	25	26	27	24	18	20	23	23	20	20	17
Number of days on which hail or snow fell	9	0	0	2	18	25	28	24	20	26	25	15

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INSTRUMENTS ON STATION.

Two standard barometers, four standard thermometers, two standard maximum thermometers, two standard minimum thermometers, two standard hygrometers, two standard anemometers.

SAINT PAUL, MINN.

[*Official number*, 39.]

Latitude	44° 53′
Longitude	93° 05′
Mean barometer for year ending September 30, 1874	29.955
Mean temperature for year ending September 30, 1874	42°.6
Amount of rain-fall	33.42 inches.

No change has been made in the location of the office since last report. Sergt. H. E. Cole was transferred to another station January 29, 1874, and succeeded by Sergt. W. O. Bailey, who still remains and has given satisfaction. The same assistant who was on duty at last report still remains.

The station was inspected in May, 1874, and found in good condition.

The following extract is given from the sergeant's semi-annual report:

Capt. John H. Raney, agent Northwestern Packet Company, regards these reports with decided esteem and unlimited confidence. When required to estimate the tariff on freights to and from points throughout the Mississippi, Missouri, and Ohio Valleys, our reports are referred to as the only bases by which an accurate estimate can be arrived at. These reports are also used very extensively in another direction. Lumber-merchants, who are interested in valuable and extensive shipments of rafted logs from Stillwater and other points on the upper Mississippi, watch and accept our reports as the only reliable authority by which they may properly govern their shipments. This information was brought to my notice by Mr. W. H. Clark, a prominent citizen and lumber-merchant of Saint Louis, who is at present managing his business interests in this section of the country, and frequently visits the office to obtain information, which your sergeant is enabled to furnish.

This is only one example of numerous other cases, which illustrate the increasing popularity and influence of the signal-service reports.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	1,978
Number of press-reports issued during the year ending September 30, 1874	651
Number of Form 26 issued during the year ending September 30, 1874	1,808
Number of Form 22 issued during the year ending September 30, 1874	88
Total	4,525

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain-gauge.

THATCHER'S ISLAND, MASS.

[*Official number*, 125.]

Latitude	42° 36′
Longitude	70° 34′

This station was established September 3, 1874, for the display of cautionary signals only, and is not supplied with instruments. It is connected with the mainland and the Western Union Telegraph office

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in Rockport by cable and a short land-line built by the Signal Service. A flag-staff for displaying signals has been erected, but quarters for the man in charge have not yet been secured. Private Edmund Davis is on duty, and is a fair telegraph operator.

TOLEDO, OHIO.

[*Official number*, 35.]

Latitude	41° 40′
Longitude	83° 32′
Mean barometer for year ending September 30, 1874	30.021
Mean temperature	51°.0
Amount of rain-fall	32.53 inches.

No change has been made in the location of the office at this station since last report. Sergt. J. E. Cook remains in charge, and has performed his duties in a satisfactory manner. He was absent with permission during the month of December, 1873, and Sergt. S. B. Lum attended to the station-work until his return. One assistant was promoted during the year and assigned to the charge of another station. Two assistants are now on duty. The station was inspected in July, 1874, and everything found in good condition. Twenty-two cautionary signals have been displayed, of which fifteen are reported as wholly verified and three as partly verified at the station. Since February 4, 1874, reports have been received here from fifty other stations in the morning and afternoon, and from seventy stations at midnight.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	5,069
Number of maps issued during the year ending September 30, 1874	3,144
Number of press-reports issued during the year ending September 30, 1874	335
Number of Form 15 (manifold) issued during the year ending September 30, 1874	2,426
Number of Form 22 issued during the year ending September 30, 1874	42
Total	11,016

INSTRUMENTS ON STATIONS.

Two standard barometers, two standard thermometers, one standard water-thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one double self-register for anemometer and anemoscope, one standard wind-vane, one standard rain-gauge.

TYBEE ISLAND, GA.

[*Official number*, 121.]

Latitude	32° 00′
Longitude	80° 52′
Elevation of barometer above sea-level	28¼ feet.

This station was established June 11, 1874, by Sergt. Hugh R. Stockman, who still remains in charge and has no assistant. The office is located in a one-story building 150 feet from the beach. Regular observations are made and mailed weekly to the central office, and tri-daily synchronous reports are telegraphed regularly to Savannah at the request of the merchants of that city, and free of cost to the Government. The station is designed especially for the display of cautionary

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signals, and will undoubtedly be useful to the shipping of Savannah for this reason. A severe storm visited the station September 28, 1874, of which the sergeant remarks: "Instrument-shelter carried six feet toward the west. * * The gardens of the Tybee light-station and all low portions of the island flooded with salt-water. Boat-houses of Tybee Telegraph Company, Tybee light-station and private parties destroyed, and their boats washed from 50 to 100 feet above high-water mark. Verandas, fences, &c., knocked down."

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, two standard hygrometers, two standard anemometers, one small wind-vane, one standard rain-gauge.

VICKSBURGH, MISS.

[*Official number*, 61.]

Latitude	32° 23′
Longitude	90° 54′
Mean barometer for year ending September 30, 1874	30.121
Mean temperature for year ending September 30, 1874	66°.5
Amount of rain-fall for year ending September 30, 1874	65.24 inches.

No change has been made in the location of the office during the year, and Sergt. John Dascomb remains in charge, with one assistant. Two assistants have been relieved, one for promotion and the other for misconduct. The station was inspected in January, 1874, and found in fair condition. All reports passing over the New Orleans and Cincinnati circuit are received here, and selections from them published in the daily newspapers. Considerable interest is taken in the reports by the medical fraternity, and also by the citizens engaged in the river trade.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	1,680
Number of Form 26 issued during the year ending September 30, 1874	1,941
Number of Form 22 issued during the year ending September 30, 1874	34
Total	3,655

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, two small wind-vanes.

VIRGINIA CITY, MONT.

[*Official number*, 77.]

Latitude	45° 20′
Longitude	112° 03′

The location of office remains as at date of last report, and Sergt. J. B. Campbell continues in charge. Telegraphic communication with this station is very irregular and uncertain, and many failures have occurred from this cause. The mail-reports have also been received

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very irregularly, owing to the frequent illness of the sergeant and his consequent inability to make out the forms at the proper time. The station has not been inspected during the year.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard wind-vane, one standard rain gauge.

WASHINGTON, D. C.

[*Official number*, 19.]

Latitude	38° 53′
Longitude	77° 01′
Mean barometer for year ending September 30, 1874	30.068
Mean temperature for year ending September 30, 1874	55°.8
Amount of rain-fall for year ending September 30, 1874	39.23 inches.

Sergt. Theodore Smith was in charge of the office until October 1, 1873, when he was commissioned a second lieutenant in the Fifteenth United States Infantry, and succeeded by Sergt. Theodore Mosher, who was transferred from Cincinnati for that purpose. During the year he has performed all the duties imposed upon him promptly, intelligently, and faithfully. Untiring in his labors, and possessed of unusual executive ability, he is entitled to special commendation.

Sergts. T. B. Jennings and E. B. Robbins remain in charge of the office night-reliefs, and have been constant and regular in the performance of their duties. Sergt. James B. Newlin continues in charge of the correspondence of the station division, and, as in previous years, acquitted himself to the entire satisfaction of the officer in charge of stations. Sergt. H. C. Hirst remains in charge of the printing-room, and Sergt. P. F. Nagle of the lithographic rooms, and this fact is of itself sufficient evidence that they have worked zealously and satisfactorily.

In the lithographic department marked improvement has been made in the character of the work turned out, while that from the printing-office will compare favorably with any other office in the city.

While special mention is made of these men, it is only just to say that they have been aided by an excellent corps of assistants.

PUBLICATIONS.

Number of bulletins issued during the year ending September 30, 1874	18,241
Number of maps issued during the year ending September 30, 1874	140,837
Number of farmers' bulletins issued during the year ending September 30, 1874	182,490
Number of weekly weather-chronicles issued during the year ending September 30, 1874	20,068
Number of monthly weather-reviews issued during the year ending September 30, 1874	11,940
Number of international bulletins issued during the year ending September 30, 1874	75,287
Number of special river-reports issued during the year ending September 30, 1874	2,312
Number of Form 15 (manifold) issued during the year ending September 30, 1874	5,540
Number of Form 22 issued during the year ending September 30, 1874	137
Total	456,852

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INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one double self-register for anemometer and anemoscope, one standard wind-vane, one standard rain-gauge.

WILMINGTON, N. C.

[*Official number*, 20.]

Latitude	34° 11′
Longitude	78° 10′
Mean barometer for year ending September 30, 1874	30.092
Mean temperature for year ending September 30, 1874	63°.4
Amount of rain-fall for year ending September 30, 1874	56.02 inches.

The location of the office remains unchanged.

Sergt. Otto Schutze, who was in charge at the date of last report, was relieved June 20, 1874, by Sergt. S. B. Lum. Both men have made their returns regularly and promptly. Two assistants have been relieved during the year, one to assume charge of another station and the other as a candidate for promotion. Two assistants are now on duty, and both are favorably mentioned by the sergeant for their attention to duty.

The station was inspected December 9, 1873, and found in excellent condition.

Seventeen cautionary signals have been displayed during the year, of which fourteen are reported as wholly verified and two partially verified at the station.

Previous to February 4, 1874, no reports were received here from other stations, but since that date full reports from all stations are received at midnight, and those from all but the northwest and extreme west in the morning and afternoon.

PUBLICATIONS.

Number of bulletins issued during year ending September 30, 1874	3,408
Number of maps issued during year ending September 30, 1874	1,166
Number of local reports issued during year ending September 30, 1874	285
Number of Form 22 issued during year ending September 30, 1874	31
Total	4,890

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, two standard anemometers, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

WOOD'S HOLE, MASS.

[*Official number*, 60.]

Latitude	41° 33′
Longitude	70° 40′
Mean barometer for the year ending September 30, 1874	30.037
Mean temperature for the year ending September 30, 1874	48°.0
Amount of rain-fall for the year ending September 30, 1874	53.90 inches.

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The office was moved, October 31, 1873, from Water street to Main street, near the telegraph and post offices. The location is a good one for the exposure of instruments and the display of cautionary signals. Sergt. J. K. P. Purdum continues in charge, and has forwarded his reports in a satisfactory manner.

The station was inspected in October, 1873, and found in fair condition. Twenty-eight cautionary signals have been displayed, of which twenty-two were verified at the station. The interest taken in the service at this point by sea-going men appears to be on the increase.

The sergeant reports that whenever the signal is hoisted nearly every vessel in sight puts into harbor and remains until it is lowered. Reports are not received here from other stations.

INSTRUMENTS ON STATION.

One standard barometer, two standard thermometers, one standard water-thermometer, one standard minimum thermometer, one standard maximum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

WYTHEVILLE, VA.

[*Official number*, 91.]

Latitude	36° 56′
Longitude	81° 00′
Mean barometer for year ending September 30, 1874	29.862
Mean temperature for year ending September 30, 1874	51°.3
Amount of rain-fall for year ending September 30, 1874	40.66 inches.

The location of the office remains unchanged, and Sergt. F. Z. Gosewisch continues in charge. He was absent, with permission, from August 1 to September 1, 1874, during which time the station-duty was performed by Sergt. John Laurens, who was sent from the central office for that purpose. The station was inspected in April, 1874, and found in excellent condition. The inspector commends Sergeant Gosewisch for his close attention to duty. All reports have been forwarded promptly and in satisfactory form.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard maximum thermometer, one standard minimum thermometer, one standard hygrometer, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one standard wind-vane.

YANKTON, DAK.

[*Official number*, 95.]

Latitude	42° 45′
Longitude	97° 30′
Mean barometer for year ending September 30, 1874	30.018
Mean temperature for year ending September 30, 1874	46°.4
Amount of rain-fall for year ending September 30, 1874	23.16 inches.

No change has been made in the location of the office at this station during the year. Sergt. Newton Phelps was in charge until October 2, 1873, when he was relieved by Sergt. C. A. Shaw, who has managed the station satisfactorily since that date without assistance. The station

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was inspected in June, and found in good condition. Telegraphic communication has been somewhat irregular, but improvement in this respect is promised at an early date.

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, two standard minimum thermometers, two standard maximum thermometers, one standard water-thermometer, two standard hygrometers, one standard anemometer, one self-register for anemometer, one standard rain-gauge, one small wind-vane.

BRITISH AMERICAN STATIONS.

Instruments for five stations were sent in May, 1874, to Mr. Kittson, the agent of the Hudson Bay Company, at Saint Paul, Minn., with the request that they be forwarded to the designated points at as early a date as practicable. Full instructions accompanied each set of instruments, and upon the receipt of a favorable reply from Mr. Kittson, Lieutenant Gibbon, acting signal-officer, was ordered to take personal charge of the instruments and deliver them in good condition to the agent at Fort Garry, Manitoba. Only one of the stations has been heard from, that at Fort Simpson, where the supplies arrived in good condition.

The following table shows the points selected and their geographical location:

FORT CHIPPEYAN.

Latitude	59° 00′
Longitude	112° 00′

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard hygrometer, one standard anemometer, one standard rain-gauge.

CUMBERLAND HOUSE.

Latitude	53° 30′
Longitude	102° 00′

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard hygrometer, one standard anemometer, one standard rain-gauge.

FORT YORK, (YORK FACTORY.)

Latitude	57° 45′
Longitude	92° 30′

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard hygrometer, one standard anemometer, one standard rain-gauge.

FORT McPHERSON.

Latitude	67° 00′
Longitude	134° 30′

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INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard hygrometer, one standard anemometer, one standard rain-gauge.

FORT SIMPSON.

Latitude..... 62° 00′
Longitude..... 122° 00′

INSTRUMENTS ON STATION.

Two standard barometers, two standard thermometers, one standard hygrometer, one standard anemometer, one standard rain-gauge.

WEST INDIAN STATIONS.

Three new stations in the West Indies have been added during the year, and reports received from them irregularly by telegraph. All those mentioned in the last annual report continue making reports as regularly as the telegraphic facilities will permit. Mr. James Gall, of Kingston, Jamaica, has exercised, under the direction of the central office, a general supervision over these stations, and the office is under especial obligations to him for the public-spirited manner in which he has attended to this duty.

HAVANA, CUBA.

[*Official number*, 100.]

Latitude..... 23° 9′ 24″
Longitude..... 82° 22′

Reports received by telegraph from October 1 to November 7, 1873, and from June 1, 1874, until the date of this report, and will be continued during the month of October. During the interval reports have been forwarded regularly by mail. Mr. Charles Hasselbrink continues to make the observations.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard hygrometer, one standard rain-gauge, one standard anemometer.

KINGSTON, JAMAICA.

[*Official number*, 4.]

Latitude..... 17° 58′
Longitude..... 76° 47′ 30″

Reports forwarded by telegraph until November 26, 1873, and from June 1, 1874, to date. Mail-reports forwarded regularly during the whole year. Mr. James Gall is the observer, and has taken a lively interest in the work.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard maximum thermometer, one standard minimum thermometer, one standard anemometer, one standard hygrometer, one standard rain-gauge, one small wind-vane.

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SANTIAGO DE CUBA.

[*Official number*, 3.]

Latitude	19° 55′
Longitude	75° 50′

Telegraphic reports received from June 2, 1874, to date. Mail-reports regularly since January 1, 1874. Mr. Robert Mason is the observer.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard hygrometer, one standard anemometer.

ST. THOMAS.

[*Official number*, 102.]

Latitude	18° 20′ 24″
Longitude	64° 55′ 45″

Telegraphic reports began with the afternoon report of June 3, 1874, but have been received very irregularly, owing to a local difficulty in reference to the possession of the instruments. This will soon be settled and work recommenced in the proper manner. Mr. W. S. Cameron is the present observer.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard hygrometer, one standard rain-gauge, one small wind-vane, one standard anemometer.

GUADELOUPE.

(Point-a-Pitre.)

[*Official number*, 9.]

Latitude	16° 07′
Longitude	61° 30′

Telegraphic reports began July 9, 1874, and have been received irregularly since that date. Considerable difficulty was experienced in getting a barometer to this station, but this has been finally overcome. Mr. L. V. Bigard is the observer.

INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, two standard hygrometers, one standard anemometer, one standard rain-gauge, one small wind-vane.

BARBADOES.

(Bridgetown.)

[*Official number*, 8.]

Latitude	13° 4′ 12″
Longitude	59° 37′

The telegraphic reports began June 2, 1874, with Mr. E. Racker as observer, and have been forwarded since that date whenever practicable. Mail-reports are received regularly.

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INSTRUMENTS ON STATION.

One standard barometer, one standard thermometer, one standard hygrometer, one standard anemometer, one standard rain-gauge, one small wind-vane.

The telegraphic reports from all these stations have been forwarded by mail from Key West, since September 16, owing to an interruption in the cable communication between Key West and Punta Rassa.

SPECIAL RIVER-STATIONS.

One station, that at Helena, Ark., has been added during the year. Reports have been made daily by telegraph from October 1 to November 30, 1873, and from April 1 to June 30, 1874. They will be resumed again October 1, and continued until the close of navigation on the western rivers.

Observations during the intervals were taken regularly and forwarded weekly by mail to the central office, and where special circumstances appeared to render it necessary reports were telegraphed to the same point.

A rain-gauge and wind-vane have been issued to each station, in order to make the observations more complete, and reports of rain-fall are now included daily with the other data.

The observer at Freeport has purchased a set of instruments for his personal use, and forwards weekly reports of his observations to this office.

From Mr. J. B. Miles, at Helena, much valuable information has been received in reference to the Mississippi River, especially during the flood of the present year.

Doctor Childs, at Plattsmouth, Neb., has also given especial attention to his records, while all have done well; and an examination of the accompanying table will show that few changes have been required during the year.

Stations.	Rivers.	Names.	Commenced reporting.
1. Freeport, Pa	Alleghany	David Alter	April 17, 1873
2. Hermann, Mo	Missouri	Edward Kehr	April 24, 1873
3. Jefferson City, Mo	Missouri	Louis C. Lohman	May 12, 1873
4. Oil City, Pa	Alleghany	W. R. Stevenson, C. E	April 20, 1873
5. Brownsville, Pa	Monongahela	J. Allen Hubbs	June 6, 1873
6. Evansville, Ind	Ohio	A. C. Pushee	April 21, 1873
7. Confluence, Pa	Youghiogheny	M. Tannehill	April 23, 1873
8. New Geneva, Pa	Monongahela	H. T. Davenport	April 24, 1873
9. Lexington, Mo	Missouri	Z. S. Mitchell	April 28, 1873
10. Kansas City, Mo	Missouri	W. A. M. Vaughan	April 21, 1873
11. Brunswick, Mo	Missouri	G. D. Kennedy	May 1, 1873
12. Little Rock, Ark	Arkansas	C. H. Conradt	April 21, 1873
13. Plattsmouth, Neb	Missouri	A. L. Child, M. D	April 20, 1873
14. Marietta, Ohio	Ohio	J. H. Best	April 19, 1873
15. Saint Joseph, Mo	Missouri	Robert Gunn	May 8, 1873
16. Warsaw, Ill	Mississippi	D. H. Cox	May 7, 1873
17. Paducah, Ky	Ohio	Capt. C. Bachman	May 1, 1873
18. Boonville, Mo	Missouri	C. P. Forman	April 28, 1873
19. Le Claire, Iowa	Mississippi	C. P. Disney	June 2, 1873
20. Helena, Ark	Mississippi	J. B. Miles	Feb. 25, 1874

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CANADIAN STATIONS.

Six new stations have been added during the year, and another one is promised on October 1, 1874. Three of the new stations do not report by telegraph, but their records are mailed weekly by Professor Kingston to Washington, with the records from the telegraphic stations. None of those named in last report have been discontinued, and all reports have been received with great regularity.

The old stations are named in the accompanying table:

Toronto, Ontario. Official number, 58. Latitude, 43° 39′ 24″; longitude, 79° 21′.

Montreal, Quebec. Official number, 56. Latitude, 45° 30′; longitude, 73° 25′.

Quebec, Quebec. Official number, 57. Latitude, 46° 29′ 12″; longitude, 71° 13′ 45″.

Kingston, Ontario. Official number, 80. Latitude, 44° 12′; longitude, 75° 41′.

Port Stanley, Ontario. Official number, 78. Latitude, 42° 40′; longitude, 81° 13′.

Port Dover, Ontario. Official number, 79. Latitude, 42° 47′; longitude, 80° 13′.

Saugeen, Ontario. Official number, 81. Latitude, 42° 40′; longitude, 81° 16′.

Fort Garry, Manitoba. Official number, 88. Latitude, 49° 52′; longitude, 96° 58′.

Halifax, Nova Scotia. Official number, 89. Latitude, 44° 39′ 42″; longitude, 63° 35′ 30″.

Chatham, New Brunswick. Official number, 2. Latitude, 47° 01′; longitude, 65° 30′.

Cape Rozier, Quebec. Official number, 1. Latitude, 48° 56′; longitude, 64° 21′.

The new stations are as follows:

BROCKVILLE, ONTARIO.

[*Official number*, 126.]

Latitude	44° 33′
Longitude	75° 45′
Elevation of barometer above sea-level	Unknown.

Reports began October 26, 1874.
Received by mail.

CHARLOTTETOWN, PRINCE EDWARD'S ISLAND.

[*Official number*, 127.]

Latitude	46° 15′
Longitude	63° 07′
Elevation of barometer above sea-level	Unknown.

Began reporting March 1, 1874.
Reports received by mail.

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FATHER POINT, QUEBEC.

[*Official number*, 5.]

Latitude	49° 30′
Longitude	68° 30′
Elevation of barometer above sea-level	Unknown.

Began reporting October 12, 1873.
Reports received by telegraph via Toronto and Buffalo.

OTTAWA, ONTARIO.

[*Official number*, 101.]

Latitude	45° 22′
Longitude	75° 45′
Elevation of barometer above sea-level	Unknown.

Began reporting January 1, 1874.
Reports received by telegraph via Toronto and Buffalo.

STAYNER, ONTARIO.

[*Official number*, 128.]

Latitude	44° 25′
Longitude	80° 15′
Elevation of barometer above sea-level	Unknown.

Began reporting October 27, 1873.
Reports received by mail.

SYDNEY, CAPE BRETON.

[*Official number*, 6.]

Latitude	46° 18′
Longitude	60° 09′
Elevation of barometer above sea-level	Unknown.

Began reporting November 16, 1873.
Reports received by telegraph via Toronto and Buffalo.

All instruments on these stations belong to the Canadian government, and the observers are under the immediate direction of Prof. G. T. Kingston.

The meteorological statistics of the several stations in detail are given in papers 7, 8, 9, 10, and 11.

RECAPITULATION.

Number of sergeants on station September 30, 1874	101
Number of corporals on station September 30, 1874	7
Number of privates on station September 30, 1874	139
Total	247

Of this number, four sergeants and four privates are on duty in the central office.

Number of deaths on station during year ending September 30, 1874	3
Number of desertions from station during year ending September 30, 1874	7

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PUBLICATIONS.

Number of maps issued during the year ending September 30, 1874	470,622
Number of farmers' bulletins issued during the year ending September 30, 1874	3,491,046
Number of regular bulletins issued during the year ending September 30, 1874	281,066
Number of river-bulletins (Form 26) issued during the year ending September 30, 1874	50,955
Number of press-reports issued during the year ending September 30, 1874	38,832
Number of Form 15 (manifold) issued during the year ending September 30, 1874	50,786
Number of Form 22 issued during the year ending September 30, 1874	3,718
Number of weekly weather-chronicles issued during the year ending September 30, 1874	20,068
Number of monthly weather-reviews issued during the year ending September 30, 1874	11,940
Number of international bulletins issued during the year ending September 30, 1874	75,287
Total publications	4,494,320

The labor of maintaining so large a number of stations, charged with so many different duties, each of which must be exactly rendered, and at certain instants of time day and night throughout the year, is very great. The Chief Signal-Officer has to congratulate himself that they are occupied by men of such attainment and character that comparatively few difficulties occur.

The forms herewith, papers 12, 13, and 14, are those of the tri-daily reports, as received from the stations tri-daily in cipher over a system of telegraphic circuits connecting with this Office, which have been heretofore sufficiently explained. On these cipher-forms each space of two lines contains the report of a single station. The bulletin-forms, papers 15, 16, and 17, contain the same reports, after translation from the cipher, and exhibit the information conveyed in each.

Since the date of the last annual report sixteen additional stations of observation and report have been established. Of this number seven are within the territory of the United States, near the one hundredth meridian; nine are upon the Atlantic coast, being stations of the coast-service of the Office connected with the life-saving stations. Reports are, by comity of exchange, received from six additional stations, established by the authorities of the Dominion of Canada and within the Dominion. The total number of daily reports now had by exchange from the Dominion is seventeen. In pursuance of the plan entered upon at the request of the chief of the Dominion meteorological office, warnings of approaching dangerous storms are habitually telegraphed from this office to Toronto. The display of signals by the Dominion authorities is based upon these telegrams. The friendly relations thus maintained between the two services are of benefit to both.

In the annual report of the Chief Signal-Officer of 1872 reference was made to the plan, had always in view in the occupation of stations, to so arrange that each might, from its point of observation, give notice of meteoric changes and warn against unusual disturbances for its particular section, while all should be so placed as in a series of lines, and in such relations each to the other, that the reports of any one and the contiguous stations received at the other stations, as they passed by telegraph toward the central office at Washington, should of themselves give notice of marked approaching meteoric changes. The reports of all, concentrated and charted at the central office, are intended to enable the extent, movement, and course of the disturbance to be defined and ob

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served from report to report, and warnings to be issued, by publications or by signals, at any time for the benefit of all. It is to this system, and in pursuance of this plan, the additions of the present year have been made. The stations this year established in the West Indies are extended far southward and eastward, to Barbadoes and the Windward Islands; thence the long line of guardian points runs with few breaks, and these each month decreasing, past the Capes of Florida, and, following the Atlantic coast, stretches to the distant northeast, at Farther Point and Halifax. Near the southern extremity of this line, the experience of meteorists has located the frequent origin of cyclones, which sometimes sweep in a single course through the islands and over the whole eastern portion of the United States in the vicinity of the sea. Near the northern extremity the indications of the greater number of such storms pass from the study-charts of this Office, and are lost over the Atlantic. The service of the West Indian stations has yet something of the imperfection due to their recent establishment. The telegraphic communication by cable between them has been but for a short time accomplished, and it is frequently interrupted. The observers cannot be held to that rigid rule which makes the regular reports of the service throughout the United States at once prompt and reliable. The delay of the distant reports even for a day does not, however, always destroy their usefulness. The time of movement of any storm may last for days after its ravages have commenced and are reported. As time goes on, and the work takes permanent shape, when the reports shall be regularly received at the hours due, and their indications understood by tried experience, it seems almost impossible that the great hurricanes, which pass the stations and are watched thus from the beginning of their course, should precipitate themselves unheralded on our coasts, or reach them without such warnings given as will enable those who heed them to shun their force.

The display of cautionary signals at Key West has been justified by the existence of these stations, and is ordered. The accuracy of similar displays will be increased at all the coast-stations thence northward. The class of tempests which, having their origin at sea or among the West Indies, seem to pass thence upon the Gulf of Mexico, and, coursing northward over the Gulf coast of the United States, to move over the southeastern interior to the sea-coast, or, reaching the valley of the Mississippi, are traced in their course until they reach the great lakes, will sometimes equally evoke at their origin and in their first movement the warning reports of these stations. Later, the changing reports of the Gulf-coast stations ought to give indications of their coming. A storm once originated and on its course, once fairly within the scope of the stations of the interior, the study-charts of this Office can hardly fail to indicate, in their ceaseless sequence, the place of its existence, its extent, and something of its probable march.

On the eastern coast itself the sea-coast service stations of this Office, in connection with the life-saving service, and located in the life-saving service stations, have been established during the year, at intervals, upon the sea-shore from Sandy Hook to Cape May, and from the dreaded Cape Hatteras to Cape Henry. The telegraphic wires connect each station with this Office. In addition to the regular tri-daily meteoric reports, these stations report tri-daily the condition of the sea, the character of the sea-swell, and its direction. From the time that a storm in movement upon or near the coast reaches one of these stations, or the sea-swell, which sometimes so far foreruns the storm, begins to break there with notable violence, it is possible to hear of the storm's progress

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from hour to hour. It is during the year past, and at these stations, that the study of the sea-swell, has been first commenced in the United States for such purposes of premonition. While it has been known to scientists, and the knowledge has been for years traditional among the sea-faring and coast population, that the sea-swell rolling in upon the coast is often the forerunner by many hours of that coming storm in which it has its origin, or often gives the only indication of storms which, passing far out at sea, may never reach the coast on which their dead waves break, but later fall upon some other coast, which might be timely warned, there has been, until the establishment of this service, these stations, and these lines, no facilities by which such knowledge could be made available, or the facts carefully and systematically studied in reference to their possible practical value. The usual instrumental indications at the different stations, supplemented by the indications thus to be had from the sea itself, will be of more than ordinary value. The hope is not without foundation that, as this chain of stations extends and the stations are perfected, such a knowledge of premonitory facts and of conditions actually existing on the sea-coast will be had as will enable the coasting-trade of the United States, as well as the sea-commerce from the larger ports, to be warned in time against dangers of the sea to which they are now exposed. The coast-station at Cape Hatteras is, on account of the frequent storms in its vicinity, regarded as of especial importance.

The added stations secured in the northeast and in Canada enable a better care to be had of the New England and northeastern coasts, and will in time teach something of the disturbances which, passing to the northward of the northern limits of the United States, have been hitherto too soon lost from the study-charts to admit of their being properly examined. In the seasons of approaching frosts, and in those in which markedly low temperatures accompany high barometric pressures extending slowly southward, the indications here first noticed permit information valuable to agriculture and other interests to be given. The additional stations in the far Northwest furnish added facilities for the work of such prognostication, besides answering the immediate purposes of their location, that is, to enable a more complete study to be had of disturbances which, first noticed in the Northwest, might, these stations failing, approach the western lakes without being so soon perceived. The line of stations west of the Mississippi has been pressed steadily westward along the whole length of the Mississippi Valley. Each of these stations increases by its reports the value of the whole system of reports, and each aids in the long study which must be had before the meteoric conditions over the vast plateau of the western interior, stretching north and south to the limits of the United States, east and west until it closely approaches the Mississippi Valley and the Pacific Ocean, can be fully understood, or the indications to be had from the changes there be rightly combined with those exhibited at the stations lying to the eastward and at lower levels for the studies incidental to the duties of this Office. It is by the western limit of stations here described that the more accurate studies of the Office are now limited. Farther west the territory was within the memory of those now living the Great American Desert. The time has been very short for careful meteoric study of this region, yet very many disturbances, afterward felt in the populated portions of the United States, seem to originate in or to pass over it. As this great territorial extent is penetrated by roads, by railways, and by telegraphs, the effort cannot cease to occupy

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it by stations of observation, each of which will render it less difficult to establish and to benefit by those to follow.

There has been no increase of stations upon the Pacific coast. The distance, the difficulty of telegraphic communication, and the small sums appropriated for the service, have rendered it hitherto almost impracticable to make one. The opportunities are, however, now greatly improving with the extension of the military telegraphs in Arizona and California. It is contemplated to make the stations upon these lines reporting stations as rapidly as they are occupied by the signal-service. The station on the Aleutian Islands, half-way across the Pacific, has been continued, and a station has been established at Saint Michael's, Alaska, to make a connection as closely as possible with the Russian system of meteorological observation. The preliminary action has been had for the record and forwarding of simultaneous observations to be taken at the Sandwich Islands and on the Bermudas.

In this review of reporting stations it has been attempted to show, with brevity, the views with which the plan of location has been pursued, and, to some extent, the improvement upon the information before had by this office gained by those recently established.

The scope of the full system of reports of the United States, which, having its stations in almost every State, is fringed by these additions, is by them almost complete, so far as telegraphic facilities will admit. It is westward only that greater extension is possible upon our own territory.

A brief reference was made, in the last annual report, to the benefits hoped to result from the proceedings of the Vienna Congress of Meteorologists which had then very recently terminated its session. A proposition, to the effect that it is desirable, with a view to their exchange, that at least one observation, of such character as to be suitable for the publication of synoptic charts, be taken and recorded daily and simultaneously at as many stations as practicable throughout the world, had been unanimously adopted. This Office had already entered into correspondence, requesting exchanges of such reports, with different officers and institutions representing different nations. The assent of the meteorological service of Russia, as represented by the energetic co-operation of Prof. H. Wild, director of the Russian Imperial Observatory at St. Petersburg, was that first had, and has been followed by that of Turkey, through Prof. A. Coumbary, director of the Central Observatory at Constantinople; England, through Mr. Robert Scott, director of the Meteorological Office, London; Austria, through Prof. Carl Jelinek, director of the Imperial and Royal Central Meteorological Institute at Vienna; Belgium, through Prof. E. Quetelet, director of the Royal Observatory at Brussels; Denmark, through Captain Hoffmeyer, director of the Royal Danish Meteorological Institute at Copenhagen; France, through MM. U. J. Leverrier, director of the Observatory at Paris, Marie Davy, director of the Observatory at Montsouris, and St. Claire Deville, inspector general of meteorological establishments; Algiers, through M. le General Farre, commandant superieur du génie; Italy, through Prof. Giovanni Cantoni, Royal University at Pavia; the Netherlands, through Prof. Buys Ballot, director of the Royal Meteorological Institute of the Netherlands at Utrecht; Norway, through Prof. H. Mohn, director of the Royal Norwegian Meteorological Institute at Christiania; Spain, through Prof. A. Aquilar, director of the Royal Observatory at Madrid; Portugal, through Prof. F. de Silveira, director of the Royal Polytechnic School at Lisbon; Switzerland, through Prof. E. Plantemour, director of

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the Geneva Observatory at Geneva; Dominion of Canada, through Prof. G. T. Kingston, director of the Magnetic Observatory at Toronto.

The concurrence of so many nations, representing a territory covering the larger inhabited portions of the northern hemisphere, seems to put beyond question the ultimate success of the undertaking to secure daily a simultaneous report of the meteoric conditions over the greater portion of the earth's surface. Time only is needed to extend the co-operation to countries which have not yet entered upon it, and to develop the system of similar observations, already commenced by the Office upon the sea. The opinion has become so general among scientific men that it is necessary to study the atmosphere of the earth as a unit, and the prospect of valuable discovery is so fair, that skilled and energetic co-laborers are found wherever the request is made. As an acknowledgment of the courtesy of the co-laborers, it has been the practice of this Office to furnish each a copy of the daily record of the Office made simultaneously with his own, and a copy of the monthly review. To encourage the work for the future, to render some return to those engaged upon it, and to render possible that general study which benefits all alike, the issue of the International Bulletin of Simultaneous Reports, paper 18, has been commenced. It is the intention to furnish a copy of this bulletin to each of those who become, under the plan of work above mentioned, correspondents of the Office for the Simultaneous Report; or, at their option, correspondents may receive other publications of the Office, such as the Suggestions for the Practical Use of Meteorological Reports and Weather-maps, Charts of the Average Course of Storm-tracks on Land and at Sea, &c. The average number of daily simultaneous observations now made abroad is two hundred and fourteen. It is not possible, nor is it necessary here, to dwell at length upon the advantages time will develop in the progress of this work. They will readily suggest themselves to any who propose to devote themselves to the studies it will make possible. It is enough for the purposes of this report to state that it secures for the United States the wise and cordial co-operation of a world for the solution of questions upon which the United States has entered, and will secure for the world, it is hoped, a better knowledge of the atmosphere and insight into atmospheric changes than has been hitherto possible. In the years to come, when the value of such reports has been fully tested, and telegraphic facilities are extended, the same organization which permits these readings to be now simultaneously taken, will enable as many of them as may be necessary to be telegraphically exchanged. Two hours' time would be sufficient to concentrate the land-reports of the northern hemisphere. The chart herewith, paper 19, exhibits the location of the stations from which the series of reports is now received, or assurance had that they will be forwarded.

On January 1, 1874, in pursuance of a plan agreed upon, the distinguished secretary of the Smithsonian Institution, Prof. Joseph Henry, proposed, in a letter herewith annexed, paper 20, to place in the charge of this Office, from that date, the very extensive system of meteorological reports made by volunteer observers in all parts of the United States, which, organized by the Smithsonian Institution in 1848, had been successfully conducted under its management for twenty-four years. With the approval of the Secretary of War, the charge thus courteously tendered was accepted by this Office, and the reports of the three hundred and eighty-three observers heretofore reporting to the Smithsonian Institution are now regularly entered on its files. These reports are of observations made at 7 a. m., 2 p. m., and 9 p. m., local time, at

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the different stations named. Papers 21 and 22 exhibit the circulars issued to the correspondents. Paper 23 is the form adopted by this Office upon which observations of this character are now entered.

On June 19, the very courteous proposal was made by the Surgeon-General of the Army, Brig. Gen. Joseph K. Barnes, brevet major-general United States Army, to place at the disposal of this Office, after having extracts made from them at the office of the Surgeon-General, the extensive series of observations made by the medical officers of the Army at the different military posts and stations. These reports, the continuation of the series commenced by the Medical Department in 1819, are, like those of the Smithsonian series, from observations made at 7 a. m., 2 p. m., and 9 p. m. The proposal of the Surgeon-General was accepted in a communication of date June 26, 1874. The series of the Medical Department is now regularly received and entered on the record-files of the Office. The series, at present, numbers one hundred and twenty-three. The record of observations is as the specimen form herewith, paper 24. The total of daily reports filed at the Office now numbers as follows: Total number of daily simultaneous telegraphic reports, one hundred and eight; total international simultaneous reports, two hundred and fourteen; total volunteer reports, three hundred and eighty-three; total reports of Medical Corps of the Army, one hundred and twenty-three, making a total of eight hundred and twenty-eight reports received regularly for discussion.

The data now accumulated on the files at this Office, and to which reference is thus made, afford scope for generalization differing from, and perhaps more extensive than, any now had by any one nation. The daily published study-charts of the Office, the Monthly Review, with the accompanying maps, the maps of this Office, of which copies are furnished for the census report; the charts of average directions of movement of areas of low barometer; the charts of average barometric pressures at the hours of tri-daily report, are studies of this description. Incidental to the labors which permit the announcement of probable storms, are those of this character, to be based on discussions of the data, the results of which may be, perhaps, as valuable for practical uses as any relating to premonitions simply.

The movements of areas of low barometer, with accompanying disturbances, are seen to follow, so far as relates to the United States, courses which it seems may be, to a certain degree, defined by months. The average rain-areas can be traced. The storms are seen to differ in violence and extent with the different seasons, to move with different velocities and in different directions at different times of the year, and to exhibit their changes with a certain regularity. Each chart of generalizations becomes thus, in effect, an almost rule for the future, the rule condensing in itself the accumulated experience of years. By similar labors the average meteoric condition for each section and station in the United States can be traced. Thus, for every section and for every season, there are its prevailing winds, which differ each in their duration, intensity, temperature, and humidity. Often, with certain winds, the probabilities of accompanying or following rain are found to increase or diminish. To certain winds it is better the farmer should expose his crops if he seeks to dry them. With other winds it is wise to plant; with certain winds it is safe to sail from sea or lake ports, expecting a continuance of the wind and fair weather; with others, storms are probable. For each element of the meteoric conditions, the barometric pressure, the humidity, the temperature, the clouds, &c., the Office charts and the reports upon its files open a similar field for study; and

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deductions are to be made looking similarly to practical ends. The study of these different conditions, and the determining of rules by which premonitions are to be made, with reasonable accuracy, reaches, in effect, to that of the climatology of the United States. Upon this study the Office is now entering. Its data carefully gathered upon its files, the instrumental readings made by its own observers under its own rules for the period of three years, now warrant deductions to be sought which could not be earlier attempted. The policy pursued by the Office of diffusing, as widely as possible and in condensed form, the information in its possession, enables it to benefit in studies like these by the labors of students everywhere. The results return to it in the able suggestions, based upon deductions had from its charts and data, by distinguished scholars, who thus become its associates in more definitely forming the rules on which its duties rest.

The daily official deductions, constituting the tri-daily Synopses and Probabilities, as they are styled, and the deductions in pursuance of which the orders for the display of cautionary signals are given, when necessary, are based upon the regular reports of the service-stations of observation, transmitted tri-daily by telegraph, after passing over a system of telegraphic circuits so arranged as to at once concentrate the reports at this Office, and distribute, in doing so, certain numbers of them at designated cities and posts. Special reports are demanded from any station or number of stations whenever impending disturbances threaten. The Synopses are those of the meteoric conditions existing over or near the United States, for each period of twenty-four hours terminating at the hour for each general report. The Probabilities are announcements of the changes, considered from the study of the charts, in connection with such rules and generalizations as the experience of the Office and the study of meteorologists seem to have determined, as probably to happen within the twenty-four hours then next ensuing. The study for each issue requires the drafting and study of three charts. These charts to exhibit charto-graphically the data furnished by the simultaneous report of the one hundred and eight stations, heretofore referred to, located in the United States on the Atlantic and Pacific coasts, the coasts of the Gulf and of the Lakes, in the western interior, and in the Dominion of Canada, Nova Scotia, New Brunswick, and the West India Islands. The charts are as follows:

(*a*) A chart of barometric pressures, the temperatures, and the winds, together with the wind-direction and velocities at the different stations, and the precipitation occurring, exhibits barometric pressures and the temperatures in the relation to districts of territory and to each other by a system of isobaric and isothermal lines inscribed; the wind-directions by arrows at the different stations. (*b*) A chart of the cloud-conditions prevailing over the United States, on which the different varieties of cloud reported at the stations appear by symbols. On this chart, also, are indicated the weather, as reported at each station, the direction and movement of lower and upper clouds, and each morning the minimum temperature of the preceding night, in relation to districts of territory. (*c*) A chart of the relative humidities over territorial districts, with the temperature at the several stations. This chart of humidities enables studies to be made for territorial sections, the difficulties attending the study of observations of this character being obviated, to a very considerable extent, by the intercorrection of the stations among themselves, and by the great extent of the regions over which the readings are made simultaneously. In fields so great, purely

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local conditions, in part, disappear, or affect very little the general result. With improving experience and improved instruments, the charts will improve in accuracy, and their especial indications be better understood in their relation to the atmospheric changes to be anticipated. (Papers 25, 26, 27.) The total of the readings of different instruments inscribed on each series of charts, as exhibiting the elements of the general meteoric condition, and to be considered at each report, reaches the number of two thousand one hundred and sixty. The duties of the preparation of these charts and reports have been under the immediate charge of Assistant Cleveland Abbe, A. M., First Lieut. Robert Craig, Acting Signal-Officer and Assistant, First Lieut. H. H. C. Dunwoody, Acting Signal-Officer and Assistant, and Assistant T. B. Maury, A. M., who have been relieved and alternated in the discharge of these and other special duties at such times as directed under the instructions of the Chief Signal-Officer. The daily series of study-charts are nine in number. The yearly series number three thousand two hundred and eighty-five. The field which such a series, continuing for years, opens for study and investigation is almost without a limit, and is one upon which this Office has but begun to enter.

The statements of Synopses and Probabilities have been furnished for the press at the regular hours: 1 o'clock a. m., 10.30 a. m., and 7.30 p. m., daily, and under the same rules as in preceding years. There has been no failure in the delivery of any report during this period. The total number of statements thus issued for publication has been one thousand and ninety-five. These have been telegraphed, at the moment of their issue, to the principal cities, and have appeared in some form in almost every journal in the United States. The great diffusion thus given this intelligence has, of course, its advantages. The Office has found itself, however, exposed to unexpected difficulties. It has been the plan of the Chief Signal-Officer that these published statements should never appear without the publication, also, of at least a portion of the data on which they are based, the full rehearsal of the synopsis of the conditions preceding the forecast, and the full publication of the forecast in the words in which it is issued. Every press association receiving the statement from the Office receives it on the condition that, if used at all, it shall be printed in full, and each has formally accepted the condition. Thus given to the public, the meteoric indications on which the announcements are based can be seen, the statements are better understood, and can be correctly judged by local indications upon points often so doubtful that they are stated with hesitation. The haste of our public life does not always permit this, and the Office sometimes finds itself held responsible for what purports to be its utterances so garbled in the press as not to be recognizable. It is but just to American journalists to say that the instances are very rare in which, when attention has been directed to this error, they have failed to correct it. A careful analysis of these statements of the Office, made since the date of the last report, and a comparison with the meteoric conditions occurring within the twenty-four hours and within the district to which each statement has had reference, has given an average of eighty-four and four-tenths per cent. as verified. The mode of comparison is set forth in Papers 28 and 29. The popular faith in the announcements of the Office, now entering on the fourth year of their issue, has remained unchanged; nor is it at any time sensibly lessened by the errors which now and then direct attention to the fact that, in the present condition of science, premonitions, having in their scope a territory so great as that of the United States, cannot always be correct for every part of a district. The

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close watch kept upon this Office, and the popular knowledge of the subject of its duties, for which it takes to itself some credit in its character of instructor, cannot, perhaps, be better evidenced than in the quiet criticisms to which it is subjected if an error now and then occurs in a work in which, three years ago, any success was by many deemed impossible.

The systematic instruction of officers of the Signal-Service to fit them for duties of this description has been continued, though greatly interfered with, by the small force charged with the now very extensive duties of the Office in its different branches, each of which contributes its share to the success of the whole. The duties on which the officers are engaged, each in his sphere, are such as necessarily lay well the foundation for the courses of especial study and practice. The courses once commenced, the skill increases with acquired experience. The studies to which reference has been hitherto made, and the data condensed for generalization, improve each year the material before the student for consideration.

The display of cautionary day and night storm-signals at times of threatened dangers has been had when necessary, during the year, at the following principal ports and harbors of the United States located upon the lakes, the Atlantic, and Gulf coasts: New Orleans, Mobile, Jacksonville, Savannah, Charleston, Wilmington, Cape Hatteras, Norfolk, Cape Henry, Baltimore, Cape May, Peck's Beach, Atlantic City, Barnegat, Squan Beach, Long Branch, Sandy Hook, New York, New Haven. New London, Wood's Hole, Boston, Portland, Eastport, Oswego, Rochester, Buffalo, Erie, Cleveland, Toledo, Detroit, Port Huron, Alpena, Grand Haven, Chicago, Milwaukee, Escanaba, Marquette, Duluth, Key West, Thatcher's Island, and Tybee Island. During this period seven hundred and sixty-two signals have been ordered, counting each display of each signal at each port a separate display, in anticipation of seventy-two dangerous storms. Of this number, five hundred and sixty-one, or seventy-five per cent., have been reported as verified by the occurrence of dangerous winds at the points of display or within the radius of one hundred miles, as set forth in the rules of the Office. In no instance, during the year, has any great storm reached, without fair warning given, the lakes, or any of the great ports of the United States. The signal ordered by this Office is always cautionary in its character, not announcing absolutely a storm will come, but that indications are sufficiently threatening to call for caution, both as to going to sea and for preparation for rough weather if vessels are about to sail. Accuracy will improve as the data of the Office become full enough to enable it to be judged from experience what local wind-velocities are, in general, indicated in the different seasons, and by the differing meteoric conditions, as to accompany the different barometric gradients over this continent. It is to the solution of such questions that the study of the Office is directed. Disturbances moving from the Atlantic seaward cannot, of course, be closely watched, unless the future of the sea-coast stations shall fix the indications; but those which pass along the coasts themselves, or move over the interior, so plainly exhibit their presence on the charts, that there seems to be no danger of failing to note their existence in time to give fair warning in their probable course. Reference is not here had to the sudden and local changes, as in thunder-storms and tornadoes, but to the great atmospheric disturbances which formerly swept over territorial sections of the country unforeseen and unrecorded.

The Office has extended, under the direction of the Secretary of War,

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and since the date of the last annual report, its efforts to exhibit, as widely as possible throughout the agricultural districts of the country, the results of the daily office-studies, in the form of the forecasts issuing from it, and has been in regular correspondence, in reference to its duties, with committees appointed for the purpose by one hundred and sixteen agricultural societies. (Paper 30.) In the year just past six thousand two hundred and eighty-six farmers' bulletins, exhibiting the daily forecasts, have been posted daily for public use in as many different post-offices in different cities, villages, and hamlets, located in the interior and farming regions of the country. The extent of the labor needed to reach, even in part, the vast agricultural population of the United States, is wide. At midnight of each day the midnight report of forecast is telegraphed from the central office to twenty centers of distribution, located in the different States according to the charts herewith. The centers of distribution are as follows: Albany, N. Y.; Augusta, Ga.; Bangor, Me.; Boston, Mass.; Buffalo, N. Y.; Burlington, Iowa; Chicago, Ill.; Cincinnati, Ohio; Detroit, Mich.; Leavenworth, Kans.; Logansport, Ind.; Memphis, Tenn.; Montgomery, Ala.; New Orleans, La.; Nashville, Tenn.; New York, N. Y.; Philadelphia, Pa.; Pittsburgh, Pa.; Springfield, Mass.; Saint Louis, Mo.; Washington, D. C. These centers of distribution have been located with careful reference to the number of the farming populations in the different sections of the United States, and the facilities to be had at each center for rapidly reaching with information the greatest number of individuals. The telegraphed report received at the center of distribution is at once printed by enlisted men of the Signal-Service upon bulletins, enveloped as rapidly as printed, in post-office wrappers already stamped, and addressed to the different post-offices within a radius of as many miles as can be reached by the swiftest conveyance by 2 p. m. of the following day, and are then placed in charge of the Post-Office Department, by an arrangement by which they are distributed by the fastest mails to every post-office addressed. An order of the Postmaster-General requires that each bulletin, on its receipt at the post-office addressed, shall be displayed in a frame provided by this Office, and notice of the hour of its receipt and of the moment of its display reported. The bulletins have reached the different offices and have been displayed in each in the frames at the average hour of 11 a. m. The average time thus elapsing from the moment at which the dispatch has left this Office at midnight until it has appeared, printed and bulletined, in the interior towns and villages over the territory, extending from Maine to Louisiana, has been ten hours. The fact that the interior populations can thus be reached has been established. With each year it is possible to extend the field of distribution. With each year the popular knowledge of the uses of the bulletin and some increased interest in and study of meteorology, renders the farming communities better able to judge of its correctness and to benefit by its contents. It is contemplated, as the work of the Office progresses and generalizations can be given, to add to the bulletin such brief rules as may be developed in regard to its uses in connection with such instruments as may be readily had for local use, and such others as relate to the particular crops had in hand at the different seasons of the year, with reference to the atmospheric conditions then occurring.

It requires some reflection to appreciate the extent of this work, its economy, and the great numbers of the populations it aims to benefit directly.

During the session of the last Congress the Chief Signal-Officer submitted to one of the committees an estimate, the plan of which shows

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that if the total cost of each bulletin-station at which the bulletin is displayed at each different post-office, hamlet, village, or city, was computed to be thirty-one cents per day only, the sum so resulting would meet every expense caused by the Signal-Service. A very few tons of hay saved in the course of the year in the vicinity of each station would more than compensate for the expenditures. Communications from the different districts show a general and intelligent use of these reports by the populations for which they are intended.

The duties of the Office in connection with the river-reports of the year have had relations to occurrences of unusual interest. As in the preceding years, the regular or daily reports of the changing depths of the waters in the river-channels have been recorded and published with regularity for the benefit of the river-commerce at the principal cities and ports existing on the great rivers, and have enabled the commercial populations to regulate intelligently the movement of the river-shipping. The data had at this Office, though meager, suffice to permit a foreknowledge of changes of importance likely to happen, and enable useful warnings to be given of coming floods, ice-floods, and sudden and great rises or falls of the river-levels. As an instance, a fair premonition was had throughout the Mississippi Valley of the great flood occurring in the months of last spring, and during the continuance of them special river-reports exhibited daily, with sufficient accuracy, the coming rises or falls. How much depended, in individual cases, upon these reports, cannot be known. It is sufficient for the purposes of the report to state that, without them, there were no reports directly to reach the people, and none at all comparable with these in their extent and regularity. The study of the rivers, made necessary by occurrences of this nature, has required that there should be established for each portion of the river-courses a certain level or depth of water, a rise above which is held to be dangerous to river-interests, and has, for this reason, been designated as the "danger-level." The report of First Lieut. A. W. Greely, Acting Signal-Officer, who, under instructions from the Chief Signal-Officer, has made a minute examination of the Mississippi, Missouri, and Ohio Rivers, to establish this "level," together with the added information derived from replies to inquiries from this Office, are submitted herewith in Papers 31, 32, and 33.

In connection with this study, a chart of the basins of the different principal rivers within the limits of the water-sheds of each has been compiled from the best attainable authorities, and a river-slate designed, on which are outlined the different averaged grades of the beds of the different rivers at the different parts of their course, from the head of navigation on each to the mouths by which they empty into other rivers or into the sea. (Paper 34.) The flood-waves can be traced in outline on this slate, and their movements thus noted from day to day. With this preparation, it is comparatively easy to know—an unusually heavy rain-fall being noted within any water-shed—into what river it will flow; to mark next the rise of that river, as given by the reports; to know something of the rapidity of the current with which the flood-wave must follow its course; to note then into what river the wave will pass, and, tracing in the same manner, to follow its progress to the sea. The plan of observation can be applied to any river. With stations properly placed, it can be made impossible for a flood to follow its course without notice given by telegraph of its coming. Papers 35 to 43 exhibit charts of fluctuation, to enable study to be made as to average depths of water, the average frequency of floods at the different months of the year, &c.

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To the river-reports has been added for the two years now just passed, at the request of Prof. Spencer F. Baird, United States Commissioner of Fish and Fisheries, a daily report of surface and bottom water-temperatures of the rivers and lakes and on the sea-coast, the object had in view being to determine the proper rivers and lakes in which to place the different varieties of food-fishes. It is necessary, for this purpose, to ascertain the extremes and means of the water-temperatures. These water-temperatures sometimes indicate the fact that the winter snows are thawing in the Rocky Mountain ranges in advance of other information. A similar study of water-temperatures on the Atlantic coast will give, it may be hoped, clue to yet unknown ocean-currents.

The display of bulletins of river-reports during the year has been at the following stations: Cairo, Cincinnati, Davenport, Dubuque, Keokuk, La Crosse, Leavenworth, Louisville, Memphis, Nashville, New Orleans, Omaha, Pittsburgh, Shreveport, Saint Louis, Saint Paul, Vicksburg, Yankton, Dak., and Helena, Ark.

Another series of reports, having reference to internal navigation, that of the announcement from day to day of such probable approaching changes of temperature for the different sections of the United States as would be likely to cause the freezing of the canals, or in other cases as would open them sufficiently to permit the great commerce sometimes caught and held by the ice at ports upon them to be pressed forward toward the termini of the canal, was for the first time issued during the days of the closing navigation of last fall and the beginning of winter. Many thousands of tons of merchandise and hundreds of canal-barges are annually afloat at this season of the year. The quantity of grain in transit is sometimes so large that the markets of the great cities are influenced by its movement and by the possibility of its reaching or failing to reach tide-water. Other interests are affected. The canal-reports of this Office were, under the circumstances, received with satisfaction by the commercial associations of the cities, and now constitute for the months of November, December, and January one of the regular issues of the Office. Papers 44, 45, and 46 exhibit specimens of special river, water-temperature, and canal reports.

The forms for and the facts stated in the bulletins published for the uses of farmers and seamen, for the river-reports, the canals, and the other varied interests the bulletins are intended to reach, will change gradually with increasing knowledge and facilities. Each form has, however, its object, and cannot be changed until long tests have shown it is safe to make the changes. The forms at present used are intended especially to call into use and to have information contained in the bulletin supplemented by the local knowledge of those who avail themselves of it, and by the indications of the instruments in the hands of the many competent observers throughout the country.

The regularly-printed publications of the Office have been issued during the year. Copies of these papers, the Office Weekly Weather Chronicle and the Office Monthly Review, sufficiently illustrate their character. (Papers 47 and 48.) The scope of the Review has been very greatly extended during the year by the increased number of regular and volunteer reports received, all of which are valuable for reference, and a general study of which enters necessarily into the study for the preparation of each Review. The three charts which accompany each issue of the Review exhibit an improvement, due to the increase of data. When it is considered that each of these charts is, to some extent, the reduction of data first chronicled on the ninety separate charts for the month, and exhibits thus a generalization of the conditions existing during the

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month, it will be readily understood how much this constant monthly reduction simplifies the matter of generalization for the year. The wide circulation given this Review meets, in part, the expressed wish for generalizations prepared by this Office, while the receipt of a copy is considered by the hundreds of volunteer observers at once a sufficient acknowledgment and compensation for their labors. Assistants Abbe, Craig, Dunwoody, and Maury have alternated in the charge of the preparation of these papers and of the charts which accompany them. The preparation of the matter for the volumes of the reports, synopses, probabilities, and facts, commenced in 1872, has been continued. These volumes, containing the record of all the tri-daily reports received at the Office from the date at which such record commenced; the tri-daily charts, based upon the study of each report; the synopses and probabilities on that date issued; with a statement of the facts or meteoric conditions which subsequent reports have shown actually existed at the time for which each forecast was made, will constitute, when issued, a meteoric record more full, perhaps, than any now published.

By an unfortunate misunderstanding, either of the intent of Congress in appropriating money for the public printing, a proportionate share of which was presumably to be used for the work of this Office, or of the information upon which Congress has acted, this work has been very greatly delayed, the data of three months only of thirty-two being yet in form for issue. It is especially recommended that a sufficient appropriation be estimated in the annual appropriation for printing for the War Department to meet the expense of this issue.

A number of charts have been prepared in the map-room of the Office under the charge of Lieutenant Jackson. An atlas of twelve charts, exhibiting the average direction of movement of areas of low barometer for each month of the year, has been here charted; the facts exhibited on these charts being deduced from the comparison of the three thousand three hundred and seventy-five tri-daily charts prepared and on file in this Office up to the date of its issue, as exhibited first in the charts of the Monthly Review, and by the reduction of these charts to the twelve which make the atlas.

The form of procedure has been as follows: The tracks of movement of all areas of low barometer for the month of January, for instance, are found laid down on the regular monthly charts of the Office prepared for the purpose, one chart being used for each January. Upon this chart are selected groups of all the tracks following the same general direction, *e. g.*, those of disturbances traced from the Gulf of Mexico, from the Southwest, from the Northwest, or from the Lake region. The points (in latitude) at which the mean track of each group crosses the meridians of longitude in the January of the first year are marked (approximately) on the meridians. These points of crossing are then connected by continuous colored lines. Each of these colored lines thus represents the favorite pathway pursued by the disturbances or storms of each group for the January of that particular year. At each end of every line is noted the number of areas of low barometer of each group of which the line shows the mean direction. The same process is then repeated for the January low barometers of the following year; the lines of mean direction pursued by them are similarly established, and the lines charted in another color, with the number of disturbances of which they respectively represent the mean course entered at each end of each line. The process is thus repeated successively for each year under consideration, and the results thus charted in a special color for each year. After all the mean January disturbances or storm-tracks of

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each group have been thus laid down in their appropriate colors for each year on the final January chart of grand means, the mean of all the means—giving the mean-direction of all these mean-directions; for each group is determined and outlined in the same manner that each separate mean was found. These grand means of all the separate tracks of all the separate groups for January are put down in broad, dark-colored bands on the large chart, and suggest, at a glance, and approximately, the probable course of any storm of any group that may arise during that particalar month (January) in any future year.

In this investigation, the few erratic and unusual tracks are necessarily omitted in the grand mean; but their number and course are given in special lines.

Very many details may be had from such charts of generalization, in addition to their relation to movements of areas of low barometer. Thus it appears upon the charts that, for the period for which they are constructed, nearly 90 per cent. more of the disturbances traced have been first noted in the Northwest and the Great Plains than in the southern parts of the country. From May to November few disturbances are from the Southwest as compared with the number from the Northwest and Rocky Mountain region. In winter, comparatively few disturbances first appear near Florida, and of those areas of low barometer first noticed on the Gulf, few pass over Florida, Eastern Georgia, and the Carolinas, in that season. A very considerable number of areas of low barometer are traced over the New England States; they seem quite evenly distributed throughout the year. About 84 per cent. of these disturbances are first noticed in the West and Northwest. Few disturbances, comparatively, are first noticed in the Gulf, and of these nearly one-half are found in the months of February and September. Of the disturbances at sea noticed over the Gulf and off the Florida coasts, those occurring late in the fall and in the winter months are generally traced parallel to the Atlantic coasts. Those noticed at other seasons are more erratic in their course. Of the disturbances appearing in the Gulf and Southwestern States, during the months of February, March, and April, a majority are traced in an easterly direction, south of the Appalachian range, and their courses then deflect northeastwardly along the coast. During the summer, fall, and winter months, a majority are traced in a northeasterly direction—west of said range. These instances are referred to as illustrations only of the studies the chart permits.

The utility of these and similar deductions the charts make easily practicable is manifest, whether viewed in relation to the pre-announcement and foreknowledge of the probable course of storms in the United States, or upon the seas in their vicinity, or with regard to the agricultural operations of the country, or the study of its climatology.

In considering the significance of the daily weather-reports telegraphically issued from this Office and printed in the newspapers, the seaman, the farmer, or the unscientific reader, with the charts of the mean directions before him, may, by referring to the proper month, have some correct idea as to the probable path an approaching storm of any group will select, and he will be able, in a measure, to anticipate its effects in his own locality. It seems probable that, when a larger induction enables the Office to more perfectly chart the monthly paths of storms, their prevision and prediction, with the aid of the tri-daily press-reports, will be made practicable to a larger circle of intelligent private observers.

Another series of charts, based upon the data of the Office, collated and reduced under the careful supervision of Assistant Abbe, has been

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similarly prepared in the map-room. Copies of these charts have been furnished the Census Bureau to accompany the census report now in preparation.

In addition to this work there have been here prepared the charts of the fluctuations of the rivers, mean-barometer charts, charts of river-basins, charts of the mean barometric readings reduced to sea-level at each reporting station at the respective hours for each separate tri-daily report for each month of the year, &c., and other charts, having for their purpose the condensation, for use, of such information as is daily needed in the study for the reports issuing from this Office.

By the publications of the Office, which have been heretofore referred to, and specimen copies of which accompany this report; by the signals displayed by day or at night at times of probable danger by the announcements of probable changes of weather in the synopses and probabilities furnished thrice daily to the press; the farmers' bulletins exhibited at so many villages and hamlets in the interior; the river and canal reports made with reference to river and canal interests; the bulletins of data exhibited at all the great cities and ports; the symbol-maps displayed in board-of-trade rooms and rooms of chambers of commerce; the weekly chronicles and monthly weather-reviews furnished to agricultural societies, commercial associations, and correspondents of this Office; the daily weather-maps; the monthly charts; and, finally, the charts condensing the results of years of observation, it is believed that the information emanating from this Office reaches daily not less than one-third of all the households in the United States. The first uses of its studies and of the data on its files thus accomplished, the condensed records furnished for the more careful study of scientists everywhere, equal, perhaps, in their form and in the regularity of their publication, those furnished by any similar institution in any country.

The work in the instrument and model room, referred to in preceding reports, has been steadily continued. It is sought, by the construction of model instruments, and the study of those hitherto devised in other countries and our own, to arrive at a reliable and economical form of self-registration for the different instruments, the readings from which enter as elements into the established meteoric reports. The benefits to result from such continuous and self-recorded readings have been long recognized. From the time at which such instruments can be supplied and used at the stations of observation within the scope of the service of the United States, a record will commence unparalleled in value to the country by any hitherto attempted. A few years of observation on such a scale, with instruments compared and readings attested, would result in the establishing of such facts and the solution of such questions relating at once to climatology and the pre-announcement of meteoric changes as cannot without them be hoped for. Among the instruments devised for the Office in the year have been a barometer and rain-gauge, both continuously self-registering by electricity, by Lieut. D. J. Gibbon, acting signal-officer; a thermometer, self-registering, made for the Office by Professor Hough, of Albany, N. Y., and a self-registering rain-gauge by Lieut. Henry Jackson, acting signal-officer and assistant. The ingenuity displayed in the construction of these instruments is remarkable. The tests for durability, facility of management, and steadiness of record have not yet seemed so fully met as to permit their general use. The removal of the inaccuracies is regarded, however, as a question of time, and the period to elapse a short one only before it will be possible to equip the necessary stations with apparatus so self-registering as to allow every instrument to be exposed with such

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similar conditions of level and shelter as will render these readings comparable and correct for any practical purposes. The uses of the collection of instruments in the instrument-room of this Office have served well the end for which it was made by the inventions they have inspired, aside from their value for purposes of instruction. A number of very beautiful and ingenious models, exhibiting visibly the different character of clouds, storm-movements, and the differing atmospheric conditions over the earth's surface at different seasons of the year, have been added to the office-collection by the labor of Sergt. P. Monet.

The purpose hitherto mentioned in the reports of this Office of arranging an instrument to be so devised as to be at once simple, strong, and inexpensive for the farmer's use, and for general use in connection with the daily bulletin, has been kept in view. The embarrassment to which the Office is subjected by constant changes of its force, has, to some extent, delayed the necessary tests; but there seems little reason to doubt that an instrument can be so arranged that its readings, supplemented by some knowledge of local signs, and by the information furnished in the bulletin-report of the Office, will enable the farming and interior communities to profit by a knowledge of coming changes better than they can now have.

It is essential to work so constant and exact as that required from the numerous stations now connected with the Office, that each station should be frequently and minutely inspected, the books and papers examined, and the instruments compared with the standard instruments. Each station ought to be inspected at least once in each period of six months. Eighty-two stations have been inspected since last report. The officers employed upon this duty have been Lieuts. A. W. Greely, F. C. Grugan, and D. J. Gibbon, acting signal-officers. The service is found to be an arduous one. The inspection necessitates a stay of some days at the station to be inspected, a critical comparison of the instruments, and a formal and minute report in writing. It renders necessary an almost constant movement of the officers from place to place, and involves much labor. The field of this duty has been commensurate with the territory of the United States. The exceedingly small force of acting signal-officers has caused the work to fall with too severe a stress upon those employed upon it. Paper 49 exhibits stations inspected.

The sea-coast service of the Signal-Service in connection with the life-saving service has grown steadily in importance. At the date of the last report a telegraphic line reaching from Sandy Hook to Barnegat had been erected, and a line from Norfolk to Cape Hatteras was in process of construction. Both of these lines have been completed. The act of Congress requiring this service contemplates the establishment of signal-stations at life-saving stations and light-houses at points along the coast in such manner that the coast and the sea in their vicinity may be at once kept under observation, warnings of approaching storms be given to vessels within signal-distance, and information of disasters and other incidents occurring be rapidly conveyed to the chain of life-saving stations and to the central office. An advantage incidental to such duties is that they permit communication to be had by signal with vessels passing in sight of any station. The soldiers of the corps upon this service are skilled as line-builders and as operators. They have been taught to take and report meteorological observations, and, as signal-men, are practiced in both the Army and Navy codes, and in that code of permanent flag-signals, known as the International code, to enable them to communicate telegraphically with vessels of any nationality.

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The extent of the field for service valuable to almost every interes represented upon our shores, the seas, or lakes, the duties of such a corps can occupy, will suggest themselves without lengthy rehearsal. Brought to that degree of perfection which they can attain, if the service is properly sustained, a vessel approaching our coast, or coasting it, ought first to be warned of a storm, if one is impending within the scope of the observation of the central office. If the storm is not shunned, and shipwreck is impending, aid can be summoned to come on steamers from ports far or near, perhaps in time to avert the disaster. If the aid fail, and the ship must strike, the life-saving service can be concentrated from sections beyond the vicinity, and in any force needed. If the wreck happens, notice can go to the wrecking companies, to the insurance, and to others interested in the vessel, while lists of passengers and crews, saved or lost, can be known, and provision sought for their necessities. Throughout all the course of the occurrence the central office can be constantly informed. A naval vessel appearing off one of the signal-stations can transmit a communication to Washington, or receive orders in cipher and by signal. In time of war, with the system completed, no part of the coast could be menaced without instant knowledge at the great centers, at headquarters, along the coast, or throughout the country, if need be, of the character of the menace and the locality. In time of peace, if desirable for commerce, a record can be kept of passing vessels, showing their signals, or brief messages can be signaled to or from them. It is contemplated to equip each station with a semaphore for uses of this kind when flags may fail, and for the purpose of enabling them to better communicate with foreign vessels.

Some reference has been already made to the character of the meteoric reports to be had at these stations. These will comprise readings taken at the actual sea-level, &c., records of sea-waves, tides, temperatures, and rise and fall of sea-level, such as it has not been in the power of the country to have hitherto, and the indications from which patient study will not fail to determine. Already, in their imperfect condition, the reports give knowledge of atmospheric disturbances existing on the sea.

Those who have devoted attention to meteoric study will easily comprehend how fully, all other monitions failing, a storm in its gradual march along the coast will give notice itself of its advance along a chain of stations connected by telegraph, and charged with no other duty than that of watching it. As the lines and stations are extended, in pursuance of law, these advantages, now limited to the Atlantic coasts, will reach also the shores of the lakes, the Gulf coasts, and the coasts of the Pacific. The work of extension must be slow, perhaps the labor of years. The results to be had are worth both the time and the labor. The telegraphic wires connecting these stations enter directly the office of the Chief Signal-Officer, and the stations and lines will become there a school of practice on which both officers and men of the service are drilled by the actual management of the lines for the telegraphic service on the far frontier or for the emergencies to arise when the Army takes the field. The plan for this instruction requires the stations to be kept open day and night, the men going to the instruments by reliefs, and the general charge of the lines and of stations being in the care of officers who are to take it by periods. Each officer will, during the time of his detail, be responsible for the equipment and management of lines and stations, the skill of the operator and the thorough discharge of their duties.

Reconnaissances for lines of this character have been made during the present year by Lieutenants Craig and Dunwoody. The lines upon the coast have been erected by enlisted men of the service and First

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Lieutenants George S. Grimes and C. C. Wolcott and Second Lieut. W. B. Weir, acting signal-officers. The stations were first manned on the section from Washington by Sandy Hook to Cape May on April 1, 1874. That from Washington to Hatteras on September 1, 1874.

In the supervisory duties relating to the construction of the lines, Bvt. Capt. H. W. Howgate has rendered valuable assistance, and that officer has been temporarily charged with their immediate management until the service shall be organized for the plan of details above referred to. Paper 50 exhibits the regulations for the sea-coast service now in use.

Since the date at which the sea-coast lines were put in operation, an average number of nine hundred and eighty-eight words has been transmitted daily to and from each station over the lines. The stations now occupied are Sandy Hook, Long Branch, Squan Beach, Barnegat, Atlantic City, Peck's Beach, and Cape May, New Jersey; Cape Henry, Virginia; and Cape Hatteras, North Carolina.

By an act of Congress approved March 3, 1873, the duty was imposed upon the Secretary of War of causing to be constructed a military telegraph from San Diego, California, via Fort Yuma and Maricopa Wells, to Prescott and Tucson, Arizona. Subsequently an act approved June 23, 1874, directed the extension of the Arizona line from Prescott to Camps Verde and Apache, Arizona, and required certain reports and duties to be under the direction of the Chief Signal-Officer. An act approved June 3, 1874, authorized the Secretary of War to construct a telegraph-line for the protection of the frontier population against Indian and other depredations. On July 30, 1874, orders were issued from the War Department directing the Chief Signal-Officer to assume charge, subject to the direction of the Secretary of War, of the construction, maintenance, and operation of the different lines provided by these acts.

On August 19, First Lieut. Allyn Capron, acting signal-officer, U. S. A., was assigned to the charge of the lines in Texas and the Indian Territory, assisted by J. C. Van Duzer, as Superintendent of Construction. (Papers 51 and 52.) On August 26, Second Lieut. Theodore Smith, acting signal-officer, U. S. A., was assigned to the charge of the lines in Arizona. The appropriation for the construction of the lines in the Indian Territory and Texan frontier had been estimated for by the Chief Signal-Officer and submitted to Congress by the Secretary of War, based upon the assumption that the lines, being for military uses, and running through territories which the United States holds occupied by troops for their protection against Indians and other depredations, would be properly and almost of necessity constructed by the labor of enlisted men. The sums appropriated are, for this reason, so small as to be barely sufficient for the purchase of material alone. The Texan line will be in length about twelve hundred miles. The country through which it passes is, in great part, a desert over which nomadic tribes of Indians wander, and shelter is to be found only at sparse military posts. The troops there stationed are at almost constant war with the fighting tribes, or they pursue bands of marauders crossing the Mexican frontier for purposes of plunder. There is no region in which lines of telegraph are more needed to render safe the development of the country and to aid in military operations. There is, perhaps, none in which it is more difficult to construct such lines. The officers charged with the duty have, however, entered zealously upon it, and have found themselves well sustained by the commanding generals and the general sentiment of the resident population by whom the promise of safety to life

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and benefit to property to follow the completion of the works is fully appreciated.

But little difficulty is anticipated in the extension of the lines in Arizona. The appropriation is greatly inadequate for the work undertaken, but supports for the wires—that material of the line the most expensive and that transported with the greatest difficulty—can, it is believed, be procured and prepared by the working-parties on or near the ground, and the work is in fair progress.

The enactment of Congress permitting the receipts of the lines in this Territory to be used for the purposes of the lines is of important assistance. After a careful reconnaissance of the line the officer in charge reports the portion already erected and in operation as in good working condition. A force of eight enlisted operators of the Signal-Service has been detailed to take charge of the stations. In the case of the Texas line, greater difficulties are to be encountered.

The great length of the line, part of which extends through an almost unknown country, has not permitted the minute reconnaissance of the route necessary to give, in detail, the amount or kind of material which can be drawn from the country in the different sections through which it passes, nor the especial difficulties to be anticipated in each. Enough, however, is known to permit it to be estimated that an additional appropriation will be necessary to complete the work undertaken.

The advantages secured in undertakings of this character by the organization of the Signal-Service and its drills of instruction at Fort Whipple, by means of which a force of trained soldiers, systematically drilled at the same time in the work of telegraphic construction, the operation of the lines, and the defense both of themselves and of the lines, when necessary, evidence themselves in these instances. The lines can be carried anywhere it is possible for troops to go, and the force employed upon them goes upon the duty with as little question, and with the same feeling that they will be properly cared for, with which they would enter upon any other duty. The wise foresight of Congress, which has provided these lines for the interior, and has turned the service of a portion of the Army in this direction, has supplemented the force of the Army by one of the most powerful aids to make that force everywhere, in a threatened district, available, to enable it to be concentrated anywhere for purposes of defense or pursuit, and to permit it to be in the power of the commanding general to know almost the course and location of raiding parties, as their movements are studied with the aid of telegraphic reports on the maps before him. It brings an aid equally efficient to advance the civilization of the country, to make the passage through, or settlement in it, comparatively safe, and to render its citizens, in time, fully able to protect themselves. The distances between the stations need not be great; a very few men can hold one of them; the lines follow the traveled routes of emigration, and aid can be at any time summoned. Little settlements will grow up, the military posts of the frontiers and the interior will be no longer isolated. The inducements to enterprise, to carry settlement forward, will cease to be counteracted by the thought that such settlement amounts to self-banishment. The messages of business or pleasure can go from post or station in less time than the courier now needs to saddle his horse before mounting to carry the dispatch the first twenty miles.

As a measure of economy for the Army alone, the outlay is more than warranted. It is recommended that measures be taken gradually to connect, as the work can be done, the posts of the Army now so isolated in the interior and Indian country, a certain number of them

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being brought within the bond of connection each year. The officers and men of the Army and the citizens of the West and the western frontiers are not alone interested in works of this description. The chain of stations to be opened and occupied by soldiers of the Signal-Service becomes at once a chain of stations of observation of those meteoric changes which, in their path, pass over the valley of the Mississippi, the eastern and populated States, and will enable more certain pre-announcements to be made and at greater periods in advance. From these stations may be had the first warnings of the dreaded "northers" forming in the interior or on their course to the Gulf of Mexico. The control of the lines will enable inquiry to be made at any time. The signals of caution to be displayed on the lakes, the Atlantic and the Gulf coasts, for the benefit of the commercial interests of our most eastern people, may, it is possible in the hereafter, be traced to the first forewarnings thus given at stations inaccessible without these lines. The community of interests is thus wide-spread. So great a portion of our territory ought not to remain a region almost unknown and unoccupied. So much of our Army ought not to be without the power of co-operation when the work to secure both the co-operation and the development demands, comparatively, little of either outlay or labor.

The circuit telegraphic service of the Office has been, during the past year, essentially the same in style as for the preceding years. The system of working forms of circuits adopted by the Office has been sufficiently described in preceding reports. This service was had over the lines of the Pacific and Atlantic Telegraph Company until December 27, 1873, at which time, the control of those lines having passed into the management of the Western Union Telegraph Company, the service was transferred to the wires of that company. On February 4, 1874, the Western Union Company accepted a system of work on that day tendered, and since that date the station-messages have been transmitted over the lines of that organization. A considerable number of messages and reports from centers of distribution, &c., pass over the lines of the Atlantic and Pacific and Franklin Telegraph Companies. The average number of station-reports transmitted daily has been ninety-six. Nine hundred and forty-one thousand eight hundred and sixty cipher words of weather-reports have been received at, and one hundred and thirty-seven thousand one hundred and twenty-eight sent from, this Office during the year. Six thousand six hundred and ninety-five telegraphic messages, other than weather-reports, but connected with that work, have also been received, and seven thousand five hundred and seventy-eight sent. There have also been received at this Office twenty-five thousand six hundred and eighty cipher-words of special river-reports.

The telegraphic business of the Office has been conducted during the past year with less difficulty than in the years preceding. In December, 1873, the Hon. Reverdy Johnson was commissioned by the Attorney-General as special assistant to the Attorney-General in matters in controversy between the United States and various telegraph companies. The grave questions which had arisen as to the rights of the United States and the duties of the companies in reference to the telegraphic service of the United States, submitted for his consideration, have elicited the official opinion published herewith, (Paper 53,) while other official action has been taken by him to bring to a settlement the matters at issue.

The service has been further benefited by the act of Congress, approved June 23, 1874, entitled "An act to protect lines of telegraph

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constructed or used by the United States from malicious injury or obstruction." (Paper 54.)

The Chief Signal-Officer has often referred to the rapidity of the telegraphic work required for this Office, and which the organization of the Office makes possible. It is hardly yet generally realized, however, that in the average time of one hour and ten minutes from that moment at which its observers at stations throughout the great territory the service covers are required to read simultaneously the different instruments at the different stations, the whole of these readings, made thus at places covering an area almost continental, have been recorded, written, and telegraphed in cipher, and received and registered in this Office. The average time elapsing from the time at which the readings at the stations have been taken at the stations, to that at which the summary reports, based on these data, have been issued from the Office, has been one hour and forty minutes.

Assistant Cleveland Abbe furnishes a preliminary report on the auroral display of April 7, 1874, (Paper 55,) and Assistant Thompson B. Maury one on barometric gradients in the United States. (Paper 56.)

Prof. I. A. Lapham contributes this year, as in several preceding ones, an interesting and valuable list of disasters on the lakes. (Paper 57.)

A list of such boards of trade, chambers of commerce, and other organizations, apart from those directly connected with agriculture, as have appointed permanent committees to confer with this Office, is given in Paper 58. Paper 59 exhibits the names of stations for whose establishment requests have been made, but which have not been established September 30, 1874.

With this rehearsal of the duties of this Office, the report of active service for the year terminates. The scope of its service is now better filled than in any preceding year. The work of organization, hitherto so engrossing, can now give place to that of improving its working. The time has now arrived when the Chief Signal-Officer deems it his duty to urge earnestly upon the Secretary of War the need of some form of more permanent organization to continue with improvement in the line of duty marked out. With duties, perhaps, as extensive as important, and reaching directly more interests of the people of the United States than those of any other bureau of the War Department; with duties dependent, also, for their best success upon patient study and long experience, in which the skill of the officer, his value to the service and the country increases with constant practice, the officers serving upon it are held by a system of uncertain details only. The work of the Office is daily embarrassed as details change. It might be wholly broken up, without intention even, by a single misconceived order, or one drawn in ignorance of the facts. Often the long labor of instruction goes on until the officer is just ready to take his share in the real labor of the service, when his personal interests call him away to some other corps which offers at least permanent position, or the needs of a company somewhere summon him to it. The struggle for the best success is, with such drawbacks, discouraging. The knowledge of duty imperfectly done may rest with the Office. The real loss is more widely felt throughout the United States. The prevision of the Secretary of War has hitherto guarded against many dangers. But the interests of the United States dependent upon the service, the sums invested to secure its success, the connections established at home and abroad, are such that they ought not to be without the protection of legislative enactment. In no duty of our Army has a service so extensive existed, serving continuously for so many years, with duties which aim to come home

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to every citizen, without formal provision made for its officers. The duties of the officers require it. Separated from their companies and commands, and held strictly to a service which has no holidays and which knows no rest; required to devote to it the best energies and talents of the best portion of their lives, serving in it continuously, as has chanced to some, through details of ten years' duration, in peace and in war, living and dying in this service alone, it is right that the permanency of their service should be recognized, and that they should look forward to advancement in it. The full duties of the Signal Service include those applicable to peace as well as war. To attain proficiency in them, the whole time of an officer during years of study and application is requisite. They comprise the military duties of the field signal service and also all the duties of the service in relation to the display of warning signals giving notice in advance of storms and floods. The latter involves the study of meteoric indications and the practice and habit of controlling the organization spread over the United States, of managing the taking, telegraphing, receipt, and collation of reports from the different stations; of deducing correct results from them and of giving necessary warnings by signals or otherwise when danger threatens. The value of the officer constantly increases with the experience had in the observation of storms, the study of meteoric indications, and the correct ordering of signals. To fulfill its demands reliably, the employment of a selected officer, once placed upon this duty, must be permanent. Provision should be made for such permanent employment, for the same reason that it is made for the permanent employment of officers on any other special service, on which may rest both life and property. It will be fatal to the service if it is attempted long to perform its duties by uncertain details.

I earnestly recommend that it be sought of Congress that it be enacted that the President be authorized to detail or appoint as assistants to the Chief Signal Officer eight officers with the rank and pay of captains, and eight with the rank and pay of first lieutenants, while so serving. The additional expense to the United States would amount to very few hundreds of dollars. The benefits to result to the service would be worth many times the expenditure.

For the enlisted men of the service there is now no future. Without legislation providing for the grades above them, they are cut off from any hope of advancement in their own service, that strongest of inducements to faithful labor which wise legislation has always provided. The act of Congress approved June 16, 1874, fixing the permanency of the service with the non-commissioned grades, has been productive of the most beneficial results. The tone of the service has been in every way improved. It would be difficult to find a more intelligent, better ordered and selected body of men than those who wear its uniform. It is right such men should have every encouragement. On any non-commissioned officer of the service rests the immediate care of the station at which he may be, separated sometimes many hundreds of miles from this office. Present there, he represents the United States in his duties with boards of trade, commercial associations, the press, and the large populations the station duties reach. Upon his faithfulness, honesty, sobriety and good conduct depend the success and reputation of the service. It is recommended, and it is necessary to retain them, that the pay of these men be made equal to that of the most favored enlisted men of the Army.

At the close of another year's service the Chief Signal Officer finds, as he reviews the results of the year, many causes for encouragement.

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While the field of duty has become great, it promises grand returns to resolute labor. The Office has to acknowledge a cordial and wide-spread co-operation at home and abroad. The wide systems of observation intrusted to its care by those hitherto charged with them, evidence the belief that there will be effort, at least, to use them wisely. It labors now in a work to which none of the great family of nations are strangers. The use of the work accomplished, the magnitude of that in the future, have been well-appreciated by scientists. There has been wanting neither acknowledgment of services already rendered, nor incentive to future effort. The popular support, and the support of the press, so long and generously given, have been continued. Criticism has been temperate, and willing to be easily satisfied. Legislation has been favorable. To aids like these, and the steady support the Secretary of War has found it his duty to render, the advance of the work has been due. There seems no difficulty to be encountered in the future greater than has been already met in the past. The opportunities for rendering a public good have widened as the service has extended. The limits to bound that which is possible, cannot be estimated.

I am, sir, very respectfully, your obedient servant,

ALBERT J. MYER,

Brig. Gen., (Bvt. Ass'g'd,) Chief Signal Officer, U. S. A.

PAPER 1.

Schedule of drills and recitations at Signal School of Instruction, Fort Whipple, Va.

DRILLS.

Train drill	Daily.
Flag and torch drills	Daily.
Carbine drills	Daily.

RECITATIONS AND PRACTICE.

Manual of signals	Daily.
Meteorology	Daily.
Telegraphy	Daily.
International signals	Daily.
Telegraphic practice	Daily.
Wand practice	Daily.
Field signal practice	Daily.

PAPER 2.

Table showing the instruction of candidates for the grade of observer-sergeants from October 1, 1873, to September 30, 1874.

Name.	Instruction commenced.	Date of promotion.	Remarks.
Simon S. Bassler	July 10, 1873	Oct. 1, 1873	In charge of station at Cincinnati, Ohio; reduced July 9, 1874; appointed corporal August 10, 1874; appointed sergeant August 25, 1874.
James Mitchell	Aug. 9, 1873	Oct. 1, 1873	In charge of station at Buffalo, N. Y.
Theodore C. Taylor	Jan. 14, 1873	Oct. 1, 1873	In charge of station at Eastport, Me.
Daniel O'Leary	July 21, 1873	Oct. 1, 1873	Reduced March 23, 1874; now on duty as assistant at Pike's Peak, Colo.
John R. Williams	Aug. 7, 1873	Nov. 1, 1873	Reduced July 18, 1874; appointed corporal September 10, 1874; in charge of station at North Platte, Neb.

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Table showing the instruction of candidates for grade of observer-sergeants, &c.—Continued.

Name.	Instruction commenced.	Date of promotion.	Remarks.
George W. McKee	Aug. 21, 1873	Nov. 1, 1873	Died at Long Branch, N. J., September 14, 1874.
John O. Barnes	Aug. 8, 1873	Nov. 1, 1873	In charge of station at Peak's Beach, N. J.
Sherman B. Lum	Aug. 21, 1873	Nov. 1, 1873	In charge of station at Wilmington, N. C.
Allen M. Geissinger	Aug. 21, 1873	Dec. 1, 1873	Reduced June 29, 1874; now on duty as assistant at Baltimore, Md.
William Stein	Sept. 6, 1873	Dec. 1, 1873	In charge of station at Cape Henry, Va.
Edwin Booth	Sept. 8, 1873	Dec. 13, 1873	Reduced August 14, 1874; now on duty as assistant at Erie, Pa.
Henry Bessant	Sept. 10, 1873	Feb. 16, 1874	In charge of station at Augusta, Ga.
Denis M. Kennedy	Sept. 10, 1873	Dec. 1, 1873	In charge of station at Squan Beach, N. J.
William D. Halliday	Oct. 9, 1873	Feb. 25, 1874	Discharged April 15, 1874.
John Laurens	Oct. 15, 1873	Jan. 10, 1874	On duty at office of Chief Signal Officer.
Emile T. Carvalho	Oct. 18, 1873	Jan. 10, 1874	In arrest at Fort Whipple, Va.
Herbert M. Wells	Oct. 18, 1873	Feb. 16, 1874	Reduced April 3, 1874; now on duty as assistant at Fort Sully, Dak.
Alois Donhauser	Oct. 22, 1873	Jan. 10, 1874	In charge of station at Albany, N. Y.
Winfield S. Popple	Nov. 2, 1873	Feb. 16, 1874	In charge of station at Savannah, Ga.
Thomas Jones	Nov. 3, 1873	Feb. 16, 1874	In charge of station at Cairo, Ill.
Peter J. Huneke	Nov. 20, 1873	Feb. 16, 1874	In charge of station at Denver, Colo.
John J. Nanry	Dec. 1, 1873	Mar. 25, 1874	In charge of station at Sandy Hook, N. J.
John D. Sumet	Dec. 2, 1873	Mar. 25, 1874	In charge of station at Key West, Fla.
Adonirum J. Berry	Dec. 4, 1873	Mar. 25, 1874	In charge of station at Grand Haven, Mich.
George H. Rohe	Dec. 6, 1873	Feb. 16, 1874	In charge of station at Pittsburgh, Pa.
Edgar McGovern	Dec. 11, 1873	Mar. 25, 1874	In charge of station at Leavenworth, Kans.
George H. Crane	Dec. 23, 1873	Apr. 1, 1874	In charge of station at New London, Conn.
Charles L. Josselyn	Dec. 27, 1873	Apr. 1, 1874	Reduced June 4, 1874; now on duty as assistant at Saint Louis, Mo.
Frank Mangels	Jan. 1, 1874	Apr. 1, 1874	Reduced August 24, 1874; now on duty at Fort Whipple, Va.
Hermann Frey	Jan. 3, 1874	Apr. 1, 1874	In charge of station at Breckenridge, Minn.
Edward D. Holbrook	Feb. 24, 1874	Aug. 8, 1874	In charge of station at Barnegat, N. J.
James H. Smith, (2d)	Apr. 25, 1874	Aug. 22, 1874	In charge of station at Bismarck, Dak.
Edward W. Boutelle	May 7, 1874	July 27, 1874	Temporarily in charge of station at Philadelphia, Pa.
Milton M. Lewis	Apr. 26, 1874	.....	Discharged July 13, 1874.
William J. Evans	May 19, 1874	.....	Promoted corporal September 21, 1874; in charge of station at Montgomery, Ala.
William D. McChesney	May 21, 1874	Aug. 22, 1874	In charge of station at Corsicana, Tex.
Edward Moran	May 27, 1874	.....	Discharged July 3, 1874.
Michael L. Landers	June 1, 1874	Aug. 22, 1874	In charge of station at Dodge City, Kans.
John G. Lynch	July 29, 1874	.....	Still under instruction.
Jacob M. Frantz	Aug. 1, 1874	.....	Do.
Jerome J. Weinberg	Aug. 17, 1874	.....	Do.
John C. Senger	Aug. 17, 1874	.....	In confinement at Fort Whipple, Va.
Robert B. Watkins	Aug. 19, 1874	.....	Still under instruction.
Charles A. Smith	Aug. 19, 1874	.....	Do.
Dwight D. Stansell	Aug. 28, 1874	.....	Do.
James T. Minchin	Sept. 3, 1874	.....	Do.
Charles W. Hobbs	Sept. 14, 1874	.....	Do.
John V. Brown	Sept. 16, 1874	.....	Do.
Cyrus Cramer	Sept. 17, 1874	.....	Do.
Charles Dill	Sept. 18, 1874	.....	Do.

PAPER 3.—*Enlisted men instructed for the position of assistants to observer-sergeants from October* 1, 1873, *to September* 30, 1874.

Names.	Placed under instruction for assistant.	Reported qualified as assistant.	Ordered on station.	Remarks.
Isaac R. Birt	Sept. 6, 1873	Nov. 22, 1873	Dec. 9, 1873	On duty as assistant at Punta Rassa, Fla.
Harry S. Montague	Sept. 11, 1873	Nov. 15, 1873	Dec. 15, 1873	On duty as assistant at Toledo, Ohio.
Charles H. Mays	Sept. 11, 1873	Nov. 22, 1873	Dec. 13, 1873	Ordered to Fort Whipple, Va., for misconduct.
Thomas Murray	Sept. 15, 1873	Nov. 15, 1873	Nov. 29, 1873	On duty at Office of Chief Signal-Officer.
Rupert R. Rodgers	Sept. 15, 1873	Dec. 6, 1873	Dec. 16, 1873	On duty as assistant at Albany, N. Y.; promoted corporal July 22, 1874.
Cyrus Cramer	Sept. 23, 1873	Dec. 6, 1873	Dec. 20, 1873	Ordered to Fort Whipple, Va., for promotion.
Adolphus E. H. Burgtorf	Oct. 1, 1873	.....	.....	Dropped from instruction; discharged January 23, 1874.

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PAPER 3.—*Enlisted men instructed for assistants to observer-sergeants, &c.*—Continued.

Names.	Placed under instruction for assistant.	Reported qualified as assistant.	Ordered on station.	Remarks.
Richard O'Dowd	Oct. 4, 1873	Dec. 27, 1873	Dec. 29, 1873	On duty as assistant at Wilmington, N. C.
Robert B. Watkins	Oct. 4, 1873	Dec. 6, 1873	Dec. 9, 1873	Ordered to Fort Whipple, Va., for promotion.
Charles Holmes	Oct. 4, 1873	.....	Dec. 1, 1873	On duty at Office of Chief Signal-Officer.
William F. Allen	Oct. 4, 1873	.....	Mar. 24, 1874	On duty as assistant at San Diego, Cal.
Fred. W. Conant	Oct. 4, 1873	Dec. 6, 1873	Dec. 13, 1873	On duty as assistant at Buffalo, N. Y.
Hermann Voss	Aug. 30, 1873	.....	May 6, 1874	On duty as assistant at Charleston, S. C.
Sidney J. Bronson	Aug. 2, 1873	Oct. 11, 1873	Oct. 17, 1873	On duty as assistant at Squan Beach, N. J.
John Moll	Aug. 30, 1873	Oct. 16, 1873	Oct. 16, 1873	Discharged the service of United States August 14, 1874.
Robert Reeder	Aug. 21, 1873	Oct. 18, 1873	Oct. 24, 1873	On duty as assistant at Chicago, Ill.
Lucius A. Welsh	Aug. 21, 1873	Oct. 18, 1873	Oct. 24, 1873	On duty as assistant at Milwaukee, Wis.
James H. Bryce	Aug. 21, 1873	Oct. 18, 1873	Oct. 24, 1873	On duty as assistant at Leavenworth, Kans.
Charles A. Ray	Aug. 25, 1873	Nov. 1, 1873	Nov. 13, 1873	On duty as assistant at Long Branch, N. J.
Pierson R. Murphey	Aug. 15, 1873	Nov. 1, 1873	Nov. 24, 1873	On duty as assistant at Escanaba, Mich.
George Feller	Aug. 30, 1873	Nov. 1, 1873	Nov. 24, 1873	On duty as assistant at New Orleans, La.
James T. Minchin	Aug. 15, 1873	Nov. 1, 1873	Nov. 24, 1873	Ordered to Fort Whipple, Va., for promotion.
Ira W. Birt	Aug. 15, 1873	Nov. 1, 1873	Nov. 24, 1873	On duty as assistant at Memphis, Tenn.
Samuel W. Naylor	Aug. 30, 1873	Nov. 22, 1873	Dec. 13, 1873	On duty as assistant at Buffalo, N. Y.
Moses E. Woodard	Oct. 15, 1873	.....	.....	Died June 7, 1874.
Eugene E. Clements	Oct. 18, 1873	Dec. 27, 1873	Dec. 29, 1873	On duty as assistant at Cincinnati, Ohio.
Neill Dumont	Nov. 14, 1873	.....	Dec. 23, 1873	Ordered to Fort Whipple, Va., for misconduct.
Lemuel H. Foster	Nov. 22, 1873	.....	Dec. 23, 1873	On duty as assistant at Augusta, Ga.
Penton Bellville	Nov. 22, 1873	.....	Dec. 31, 1873	On duty as assistant at Fort Gibson, Ind. Ter.
William Story	Dec. 13, 1873	Feb. 7, 1874	Feb. 20, 1874	Ordered to Fort Whipple, Va., for misconduct.
George H. Schroder	Dec. 30, 1873	Feb. 7, 1874	Feb. 11, 1874	On duty as assistant at Savannah, Ga.
John McKenna	Dec. 30, 1873	.....	Jan. 14, 1874	On duty as assistant at Norfolk, Va.
William Baber	Dec. 30, 1873	Feb. 7, 1874	Feb. 26, 1874	On duty as assistant at Toledo, Ohio.
George H. Smith	Jan. 14, 1874	Feb. 7, 1874	Feb. 11, 1874	On duty as assistant at Milwaukee, Wis.
Thomas A. Forbes	Jan. 15, 1874	.....	Mar. 2, 1874	On duty as assistant at Key West, Fla.
John Craig	Jan. 24, 1874	.....	Mar. 3, 1874	On duty as assistant at Oswego, N. Y.
Lucien M. Turner	Mar. 9, 1874	.....	Mar. 19, 1874	In charge of station at St. Michael's, Norton Sound, Alaska.
Hiram W. Tibbetts	Mar. 19, 1874	.....	Apr. 1, 1874	On duty as assistant at Pittsburgh, Pa.
John F. Conners	Apr. 4, 1874	.....	May 22, 1874	On duty as assistant at Keokuk, Iowa.
George B. Sharp	Apr. 25, 1874	.....	.....	Ordered to Fort Whipple, Va., for misconduct from Office of Chief Signal-Officer.
Joseph W. Compton	Apr. 26, 1874	.....	June 1, 1874	On duty at Office of Chief Signal-Officer.
George B. Till	May 9, 1874	.....	May 22, 1874	On duty as assistant at Cleveland, Ohio.
Owen S. M. Cone	May 9, 1874	.....	May 27, 1874	On duty as assistant at New Orleans, La.
Egbert Van Dyk	May 9, 1874	.....	June 6, 1874	On duty at Office of Chief Signal-Officer.
Frank B. Cooksey	May 15, 1874	June 27, 1874	June 30, 1874	On duty as assistant at Buffalo, N. Y.
Robert M. Barnitz	May 19, 1874	.....	.....	On duty at Office of Chief Signal-Officer.
John J. Buckley	June 6, 1874	.....	July 14, 1874	Ordered to Fort Whipple, Va., for misconduct.
Isaac Menah	June 6, 1874	July 25, 1874	.....	Dropped from instruction.

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PAPER 3.—*Enlisted men instruceed for assistants to observer-sergeants, &c.*—Continued.

Names.	Placed under instruction for assistant.	Reported qualified as assistant.	Ordered on station.	Remarks.
Edward H. Woods	June 9, 1874	Aug. 1, 1874	Aug. 8, 1874	On duty as assistant at Vicksburgh, Miss.
Richard J. Lewis	June 18, 1874	July 25, 1874	July 27, 1874	On duty as assistant at Saint Louis, Mo.
Llewellyern C. Stanford	June 26, 1874	July 25, 1874	.....	On duty at Office of Chief Signal-Officer.
Charles W. Roby	July 1, 1874	July 25, 1874	July 27, 1874	On duty as assistant at Albany, N. Y.
John T. O'Keefe	July 1, 1874	Aug. 1, 1874	Aug. 1, 1874	On duty as assistant at Philadelphia, Pa.
Charles J. King	July 16, 1874	.....	Sept. 3, 1874	On duty as assistant at Mount Washington, N. H.
Robert T. Porter	July 16, 1874	Aug. 15, 1874	Aug. 19, 1874	On duty as assistant at Shreveport, La.
Harry Hall	July 16, 1874	Aug. 8, 1874	Aug. 11, 1874	On duty as assistant at Mobile, Ala.
John C. Rogers	July 16, 1874	Aug. 15, 1874	Aug. 21, 1874	On duty as assistant at Louisville, Ky.
Thomas Gibson	July 16, 1874	Aug. 8, 1874	Aug. 11, 1874	On duty as assistant at Wilmington, N. C.
Herbert S. Foster	July 16, 1874	Sept. 5, 1874	Sept. 12, 1874	On duty as assistant at Albany, N. Y.
Ignatius V. Wallace	July 16, 1874	Aug. 8, 1874	Aug. 11, 1874	On duty as assistant at Knoxville, Tenn.
Clinton C. Norris	July 16, 1874	Aug. 22, 1874	Aug. 26, 1874	On duty as assistant at Charleston, S. C.
Theodore V. Van Heusen	July 16, 1874	Aug. 8, 1874	Aug. 11, 1874	On duty as assistant at Indianapolis, Ind.
John W. Wildman	July 16, 1874	Aug. 22, 1874	Aug. 26, 1874	On duty as assistant at Cleveland, Ohio.
Edward T. Upperman	July 16, 1874	Aug. 8, 1874	Aug. 13, 1874	Ordered to Fort Whipple, Va., for misconduct.
Richard N. Eastlack	July 16, 1874	.....	.....	Ordered to Fort Whipple, Va., for misconduct from Office of Chief Signal-Officer.
William Sheil	July 22, 1874	Sept. 19, 1874	Sept. 21, 1874	On duty as assistant at Rochester, N. Y.
Richard O. Trent	July 22, 1874	Aug. 22, 1874	Aug. 25, 1874	On duty as assistant at Detroit, Mich.
Joseph W. Buck	July 23, 1874	Sept. 26, 1874	.....	Awaiting orders at Fort Whipple, Va.
John Hart	July 24, 1874	Sept. 5, 1874	.....	On duty at Office of Chief Signal-Officer.
John T. Cochran	July 24, 1874	Aug. 22, 1874	Aug. 26, 1874	On duty as assistant at Salt Lake City.
John M. Clifford	July 24, 1874	Sept. 26, 1874	.....	Awaiting orders at Fort Whipple, Va.
Edward B. Garriott	July 24, 1874	Aug. 29, 1874	Sept. 3, 1874	On duty as assistant at Portland, Me.
Joseph B. Chapman	July 24, 1874	.....	.....	Dropped from instruction.
William H. Knight	July 24, 1874	Aug. 22, 1874	Aug. 26, 1874	On duty as assistant at Detroit, Mich.
Martin Hoover	July 24, 1874	Sept. 26, 1874	.....	Awaiting orders at Fort Whipple, Va.
John J. Tuttle	Aug. 1, 1874	Sept. 12, 1874	Sept. 12, 1874	On duty as assistant at Pike's Peak, Colo.
Henry L. Boyce	Aug. 1, 1874	Sept. 12, 1874	Sept. 16, 1874	On duty as assistant at Port Huron, Mich.
William H. Agey	Aug. 1, 1874	Sept. 19, 1874	Sept. 21, 1874	On duty as assistant at Philadelphia, Pa.
Frank B. Woodbury	Aug. 1, 1874	Sept. 12, 1874	Sept. 12, 1874	Do.
Harry F. McFarland	Aug. 14, 1874	.....	.....	Still under instruction.
Oliver H. Lowery	Aug. 8, 1874	.....	.....	Do.
Henry H. Hull	Aug. 8, 1874	.....	.....	Do.
George W. Kelsey	Aug. 12, 1874	.....	.....	Do.
Michael McGauran	Aug. 12, 1874	.....	.....	Do.
John W. Smith	Aug. 17, 1874	.....	.....	Do.
Edmund Davis	Aug. 21, 1874	.....	Sept. 3, 1874	In charge of station at Rockport, Mass.
John McGlone	Aug. 17, 1874	.....	.....	Still under instruction.
Orin Parker	Aug. 17, 1874	.....	.....	Do.
John W. Case	Aug. 22, 1874	.....	.....	Do.
John C. Rickli	Aug. 22, 1874	.....	.....	Do.
Henry Blair	Aug. 29, 1874	.....	.....	Do.
James J. Fitzgerald	Sept. 5, 1874	.....	.....	Do.
Frederick J. Papst	Sept. 5, 1874	.....	.....	Do.
James F. Burke	Sept. 7, 1874	.....	.....	Do.
William H. Sayers	Sept. 15, 1874	.....	.....	Do.
Thomas B. Bowlus	Sept. 15, 1874	.....	.....	Do.
James H. Crowley	Sept. 15, 1874	.....	.....	Do.
Edward F. Kubel	Sept. 15, 1874	.....	.....	Do.

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PAPER 4.

Exhibiting the communications sent from and received at the office of the Chief Signal-Officer (exclusive of telegrams) from October 1, 1873, to September 30, 1874.

SENT.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

To heads of Departments and Bureaus	117	
To observer-sergeants in reference to their duties	12,516	
In reply to applications for stations and others similar	39	
To telegraph-companies in reference to transmission of weather-reports, erection of telegraph-lines, &c	490	
To boards of trade, chambers of commerce, agricultural societies, &c	374	
To postmasters in reference to weather-bulletins	9,541	
To foreign correspondents relating to this division in general	127	
To foreign correspondents relating to synchronous reports	90	
To volunteer observers throughout the United States	951	
General and special orders and circulars with reference to this division	9,166	
Miscellaneous	1,132	
Total		34,543

SIGNAL-DIVISION.

To heads of Departments and Bureaus	122	
Relating to duties and discipline at Signal-Service school of instruction and post at Fort Whipple, Virginia	1,279	
Relating to recruiting and enlistment	70	
Answers to applications for appointment in the Signal-Service United States Army	750	
General and special orders and circulars with reference to this division	1,209	
Miscellaneous	254	
Total		3,684

PROPERTY-DIVISION.

To heads of Departments and Bureaus	459	
To manufacturers and others in reference to instruments, equipments, &c	715	
To observer-sergeants and other enlisted men in reference to property and money accounts	9,570	
In reference to quarterly returns of officers	939	
Miscellaneous	2,486	
Total		14,169
Aggregate		52,396

RECEIVED.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

From heads of Departments and Bureaus	65
Applications for establishment of new stations	45
From telegraph-companies in reference to transmission of weather-reports, construction of telegraph-lines, &c	227
From observer-sergeants in reference to their duties	11,421
From boards of trade, chambers of commerce, and agricultural societies	2,372
From foreign correspondents relating to this division in general	395
From foreign correspondents relating to synchronous weather-reports	1,236
From volunteer observers throughout the United States relating to observations and reports	4,121
Reports relative to instruction of observer-sergeants and assistants	2,807

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Mailed reports from observer-sergeants on station	249,183	
Meteorological charts, abstracts of journals, forms, &c., received from observer-sergeants on station	57,003	
Reports from postmasters throughout the United States in reference to weather-bulletins received and posted by them	117,137	
Miscellaneous	2,797	
Total		448,809

SIGNAL-DIVISION.

From heads of Departments and Bureaus	274	
Relating to duties and discipline at Signal-Service school of instruction and post of Fort Whipple, Virginia	426	
Relating to instruction in signaling at Fort Whipple, Virginia, and in different military departments	97	
Relating to recruiting and enlistment	230	
Applications for appointment in the Signal-Service United States Army	623	
Miscellaneous	1,860	
Total		3,510

PROPERTY-DIVISION.

From heads of Departments and Bureaus	435	
From manufacturers and others relating to instruments, equipments, &c	394	
From officers concerning property, quarterly returns, &c	1,188	
From observer-sergeants and other enlisted men relating to property and money accounts	17,721	
Regarding property transferred to stations	2,091	
Miscellaneous	3,414	
Total		25,243
Aggregate		477,562
Aggregate sent		52,396
Aggregate received		477,562
Aggregate sent and received		529,958

Table showing the number of cipher-words and messages sent and received by telegraph at the central office, Washington, D. C., from October 1, 1873, to September 30, 1874, inclusive.

Cipher-words of weather-reports sent	137,128
Telegraphic messages other than weather-reports sent	7,578
Cipher-words of weather-reports received	941,860
Cipher-words of special river-reports received	25,680
Telegraphic messages other than weather-reports received	6,695

PAPER 5.

List of publications received from foreign countries since September 30, 1873.

Rapporti sulle osservazioni dell' eclisse totale di sole 22 dicembre 1870, eseguite in Sicilia dalla commissione italiana. Palermo, 1872.

Die Witterungsverhältnisse des Jahres 1871, nach den Beobachtungen der würtembergishen meteorologischen Stationen zusammengestellt von Dr. H. Schoder. Stuttgart, 1873. Mit Uebersicht über Witterungsverhältnisse des Monats Januar von Juli 1873, nach den Beobachtungen der würtembergischen Stationen.

Normale Wärmemittel (Fortsetzung vom würtembergischen Jahrbuch, 1870.) C. Canstatt.

Anno XXV^{mo} della corrispondenza scientifica, bulletino delle osservazioni ozonometriche meteorologiche, fatte in Roma da Caterina Scarpellini.

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Results of meteorological observations made at the Radcliffe observatory, Oxford, in the year 1870, under the superintendence of the Rev. Robert Main.

Jahrbücher der königlichen Central-Anstalt für Meteorologie und Erdmagnetismus von Dr. Guido Scheuzl. 1ster Band, Jahrgang 1871. Buda Pest, 1873.

Resultate aus den meteorologischen Beobachtungen angestellt an vierundzwanzig königlich-sächsischen Stationen im Jahre 1870, bearbeitet von Dr. C. Bruhns. Leipzig, 1873.

Monatliche Berichte über die Resultate aus den meteorologischen Beobachtungen angestellt an den königlich-sächsischen Stationen im Jahre 1872. Mitgetheilt nach den Zusammenstellungen im statistischen Bureau des königlichen Ministeriums des Innern von Dr. C. Bruhns. Dresden, 1873.

Vent, sa direction et sa force observées à Perpignan avec un anémométrographe électrique par le Dr. Fines. Perpignan, 1873.

Bulletin météorologique du département des Pyrénées-orientales, publié sous les auspices du conseil général, année 1872. Perpignan, 1873.

De la prédiction du mouvement des tempêtes africanes et des périodes météorologiques par M. H. Farry. (2 copies.) Alger, 1873.

Die geographische Verbreitung der Gewitter in Mittel-Europa im Jahre 1856, so wie über die gegenseitige Beziehung zwischen dem Auftreten der Gewitter, der Temperatur, der Windrichtung und dem Barometerstande, von Dr. M. A. F. Prestel. Wien, 1858.

Die Gewitter des Jahres 1855: ein Beitrag zur Physiologie der Atmosphäre, von Dr. M. A. F. Prestel. Emden, 1856.

Der Boden, das Klima und die Witterung von Ostfriesland, sowie der gesammten deutschen Tiefebene in Beziehung zu den land- und volkswirthschaftlichen interessen, dem Seefahrtsbetriebe und den Gesundheits-Verhältnissen, dargestellt von Dr. M. A. F. Prestel. Emden, 1872

Procédé pour déterminer la direction et la force du vent; suppression des girouettes; application aux cyclones. Par M. H. Tarry.

Les cyclones du soleil comparées à ceux de notre atmosphère. Par M. H. Tarry.

Prolegomeni alle studie delle burrasche del clima di Roma per Giuseppe Lais, D. O., assistante all' osservatorio pontificio del Collegio romano. (2 copies.) Roma, 1873.

Sulla possibile connessione tra le eclisse di sole ed il magnetisme terrestre: memoria del P. Francesco Denza Barnabita. Roma, 1873.

Bemerkungen über die Meereshöhe von Tiflis, von A. Moritz. (Ln le 22 mars 1866.)

Der Bewegungsmechanismus am Drehthurme des Observatoriums zu Tiflis, von A. Moritz. Tiflis, 1866.

Ueber die Anwendung des Pistor'schen Reflections-Kreises zum Messen von Angular-Distanzen zwischen terrestrischen Objecten, von Dr. A. Moritz. Tiflis.

Schemacha und seine Erdbeben (ein Beitrag zur Beantwortung der Fragen welche sich an das Erdbeben vom 16. (28.) Januar 1872, knüpfen), von A. Moritz. Tiflis, 1872.

Exercices hypsométriques, par A. Moritz. Tiflis, 1869.

Die Sonnenfinsterniss vom 6. März (22. Februar) 1867, von A. Moritz. Tiflis, 1867.

Zwei Bemerkungen zu Regnaults Tafel der Spannkraft des Wasserdampfes, von A. Moritz. Tiflis, 1870.

Sammlung von Hülfstafeln zur Berechnung barometrischer Höhenbestimmungen, zusammengestellt von A. Moritz und H. Kiefer. Tiflis, 1870.

Erdbeben in Kaukasien im Jahre 1868: Auszüge aus Mittheilungen der Tifliser Zeitung "Kaukas," zusammengestellt von H. Kiefer. Tiflis, 1869.

Collection de tables à l'usage des stations météorologiques du Caucase, calculées par A. Moritz. Tiflis, 1868.

Materialien zu einer Klimatologie des Kaukasus, gesammelt und herausgegeben von A. Moritz. (Abtheilung 3: Klimatologische Skizzen, Band 1.) Tiflis, 1871.

Annals of the Imperial Botanical Society, St Petersburg. Vols. 1 and 2, 4 parts, 1871–73.

Observatoire d'Alger, 1re partie, panorama météorologique du climat d'Alger, observations météorologiques, 33 tableaux, 1 tableau graphique. Janvier 1872. Par M. Bulard.

Report upon the rain-fall of Barbados, and upon its influence on the sugar-crops, 1847–71, with two supplements, 1873–74. By Gov. Rawson. Barbados, 1874.

Jahrbücher der kaiserlich-königlichen Central-Anstalt für Meteorologie und Erdmagnetismus, von Carl Jelinek und Ferdinand Osnaghi. Neue Folge, 8. Band, Jahrgang 1871. Wien, 1873.

Zeitschrift der österreichischen Gesellschaft für Meteorologie, redigirt von C. Jelinek und J. Hann. 8. Band. 1873.

Nederlandsch meteorologisch Jaarboek voor 1872–73 [2 vols.], uitgegeven door het koninklijk nederlandsch meteorologisch Institut. Vierentwintigste Jaargang, erste Deel. Waarnemingen in Nederland. Utrecht, 1872–73.

Repertorium für Meteorologie, herausgegeben von der kaiserlichen Akademie der Wissenschaften, redigirt von Dr. H. Wild. Band 3. St. Petersburg, 1874.

Annalen des physikalischen Centralobservatoriums, herausgegeben von H. Wild. Jahrgang 1872. St. Petersburg, 1873.

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Jahresbericht des physikalischen Centralobservatoriums für 1871 und 1872, der Akad mie abgestattet von H. Wild. St. Petersburg, 1873.
Studien über meteorologische Instrumente und Beobachtungs-Methoden. 1. Ueber die Bestimmung des Luftdrucks. Von H. Wild. St. Petersburg, 1874.
Mittheilungen aus dem Gebiete des Seewesens, herausgegben vom kaiserlich-königlichen hydrographischen Amte, Marine-Bibliothek. [Vol. 1.] 1. Jahrgang. Pola, 1873.
Vierter Jahresbericht der meteorologischen Central-Station Carlsruhe über die Ergebnisse der an den meteorologischen Stationen des Grossherzogthums Baden im Jahre 1872 angestellten Beobachtungen, bearbeitet von Dr. Lübeck. Karlsruhe, 1873.
Erster und zweiter Jahresbericht für das meteorologische Jahr 1869 und 1870, enthaltend die Ergebnisse der meteorologischen Beobachtungen der badischen Stationen, bearbeitet von Dr. F. Weber.
Ueber einen einfachen Verdunstungsmesser für Sommer und Winter, von H. Wild, 13. (24.) Februar 1874.
Luftens Temperatur i og udenfor Christiania, samt dens Fraudring med Hojden, sammesteds af H. Mohn. Christiania, 1874.
Ponts et chaussées. Service hydrométique du bassin de la Seine, résumé des observations centralisées pendant les années 1871 et 1872, par M. G. Lemoine, sous la direction de M. E. Belgrand, avec 9 charts. Versailles, 1873. Et observations sur les cours d'eau et la pluie centralisées pendant l'années 1872, par M. Belgrand et M. G. Lemoine.
Quarterly weather-reports of the Meteorological Office, London, part 3, July to September, 1871; part 3, July to September, 1872; part 4, October to December, 1872; part 1, January to March, 1873.
Daily weather-bulletin, July, 1872, to June, 1873. 2 volumes.
Report of the meteorological committee of the Royal Society for the year ending December 31, 1873.
Third report of the Meteorological Office of the Dominion of Canada, for the fiscal year ended June 30, 1873, by G. T. Kingston, M. A., superintendent.
Geological survey of Newfoundland, by A. Murray: report of progress for the year 1873.
Magnetische und meteorologische Beobachtungen auf der kaiserlich-königlichen Sternwarte zu Prag im Jahre 1872, auf öffenliche Kosten herausgegeben von Carl Hornstein. Prag, 1873.
Notice sur le service météorologique aux États-Unis, par M. Malézieux. Paris, 1873.
Bericht über Wetter-Telegraphie und Sturmwarnungen, abgestattet an den meteorologischen Congress in Wien, von der dafür auf der Leipziger Conferenz ernannten Comité, redigirt von G. V. Boguslawski. Berlin, 1874.
An attempt to establish relation between the velocity of wind and its force, by Robert H. Scott.
Report on weather-telegraphy and storm-warnings, presented to the meteorological congress at Vienna by a committee appointed at the Leipsic conference. (Published by authority of the meteorological committee.) London, 1874.
Charter and by-laws of the Meteorological Society, London.
Studii intorno ai diametre solari del P. Paolo Rosa, della Compagnia di Gesu, assistente all' osservatorio pontificio del Collegio romano. Roma, 1874.
An abstract from the meteorological register of the observatory of Algiers. November, 1863, to May, 1864.
Météorologie sécheresse et inondations nécessité de reboisement, par M. Bulard.
Observatoire d'Alger. Résumé météorologique des deuxième et troisième trimestres de 1868, par M. Bulard. Observatoires météorologiques, janvier et février 1871. Résumé météorologique des mois de mars, avril et mai 1871. M. Bulard.

PAPER 6.

[Extract from daily journal.]

SUMMIT OF PIKE'S PEAK, COLORADO TERRITORY.

OCTOBER, 1873.

Water, which having to be conveyed in demijohns a distance of three-fourths of a mile over the worst part of the trail on foot, has been rather scarce with us; but that part of the labor has been done away with since October 22, on which day a terrific snow-storm began, and continued for three days and nights, and during that time deposited about three feet of snow on the peak, (the fall of snow being much heavier, but owing to the prevalence of a high wind—estimated at fifty miles per hour—during

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the snow-storm, the snow was drifted and blown into the gullies and ravines that surround the peak, where it now lies in immense banks.)

This snow, melted, is our only drink, and the process is a slow one, owing to the lack of vessels on hand, a tea-kettle and iron dinner-pot being the only ones fit for use.

The winter has set in with unusual severity and earlier by a month than at any time during the last twenty years. Thus croaks the oldest inhabitant.

It is a notable fact that nearly everybody complains of sickness on ascending the mountain for the first time, the symptoms being dizziness and headache, accompanied by vomiting. I, myself, was affected in this manner during the first two days, but feel quite well now.

NOVEMBER, 1873.

November 1.—Commenced taking regular observations at 5.42 a. m. Weather today very variable.

November 2.—At 4.45 p. m. a curious and remarkable phenomenon was observed. In the distance to the northeast a heavy mist was hanging over the plains. On this mist was depicted a perfect shadow or profile of our Peak by means of the setting sun. The image was very realistic; so much so, that one could hardly credit that it was merely a shadow and not a lofty peak rising abruptly from the prairie. This continued for the space of fifteen minutes, when it gradually melted away in the mist as the sun was setting behind the gigantic peaks of the "Snowy Range." During the presence of the phenomenon we watched it with curious interest, and much regretted when it faded from our sight.

(NOTE.—This phenomenon has since been observed to be of almost daily occurrence, both at sunrise and sunset.)

November 9.—Three men came to the summit about fifteen minutes after sunrise; they started at 2 a. m. just to watch "Old Sol" make his first appearance over the plains—a spectacle the like of which but few mortals are favored with—and after a very tiresome journey of four hours they had the satisfaction of being just fifteen minutes too late. These three men were not very enthusiastic when they started for home again.

November 10.—The shadow of the Peak was again depicted on the haze at sunset; it seems to be a common occurrence at sunset, with a hazy or smoky lower atmosphere. I also saw the shadow cast by a very small cirrus cloud (due south of us) stretching way to the western horizon and coming to a sharp point there. This was between 2 and 3 p. m.

November 10.—A lady, accompanied by a guide, visited the summit this afternoon. She expressed much surprise that a station should be established at such an out-of-the-way place, when there were plenty of better places down below! *Sancta simplicitas.*

November 17.—This day will be remembered by us years hence. The temperature kept on increasing after 9 p. m. of last night; the maximum thermometer reading as high as 32° this morning. The moderately brisk wind prevailing at last observation on Sunday night increased to a hurricane shortly after midnight, which shook our house to its very foundation. The northwest end of the roof, although weighted down by heavy rocks, was frequently lifted up several inches above the wall, tearing away the plastering, which fell in showers over my bed, desk, and the floor. Sleep was out of the question, as I momentarily expected to see the roof fly off and leave us in the cold. Lying awake, I could hear the tin being wrenched off the sheathing-boards, where we had nailed it with great pains and much confidence in its security.

November 17.—Morning brought no abatement of the gale. At 5.30 a. m. I went out doors to wet the bulb of our hygrometer. On turning the northeast corner of the house, a terrific squall landed me, unceremoniously, in a ditch six feet to the leeward.

The anemometer showed an average velocity of sixty-five miles per hour, but some of the squalls were greatly superior in force. As the condition of our roof became more and more alarming, I determined to put some more rocks on top of it, although it was nearly impossible to stand up in the face of the hurricane. Lemman, the heaviest and strongest, took his position on top of the roof, and with the aid of a rope hauled up a number of the heaviest possible rocks, myself and Smith assisting from below with poles. It was terrible work, for often, after getting a rock nearly to the roof, a sudden gust of wind would knock all three of us off our legs, and the rock would barely miss falling on Smith or myself. However, we succeeded in getting up about a ton of rock, which effectually stopped the lifting of the roof. As soon as the gale subsides we will put up as many more. The hurricane abated somewhat during the afternoon, backing more to the westward; but the sky, which had been almost cloudless, became overcast with a low sheet of stratus, looking very much like coming snow. The temperature fell rapidly, with increasing humidity; the barometer also continued its downward course. At 6.30 p. m. a furious storm of snow and sleet set in; the wind rose to heavy squalls, and veered to the northeast, and the thermometer gave promise of reaching the zero-point before morning. Snow ended before midnight, but a very heavy northeast gale continued throughout. The telegraph-line was "down" this morning, and after

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dinner I sent Smith down the mountain to repair the break, but he returned with the report that the line was O. K. as far as timber-line. At 3 p. m. the line was spliced by Sergeant Sackett, who had left Colorado Springs this morning, and I sent off the forenoon and afternoon reports. Sergeant Sackett, accompanied by two gentlemen, reached the summit at 8 p. m. and remained over night. Sergeant Sackett reports the line as having been broken in nine different places by the falling of timber, and in the opinion of every one it will be impossible to keep the line in repair unless the timber is cut down on either side of it. Just as I was about to send off the midnight report the line parted again.

November 19.—Mr. Copley, the wood-contractor, called here to-day. He is going to petition Congress for permission to build a hotel near the summit. I hope and pray that some one will be allowed to build, for the visitors will bother us to death, and eat us out of house and home if we have to shelter and feed them. It is said that last summer over two thousand people visited the summit, and as many more would have come had there been any trail. Encouraging prospect for next summer.

November 20.—To-night I played a game of checkers by telegraph with Capt. W. W. Allen, at Colorado Springs. The boards used are numbered from 1 to 32, and each player, as he moves from one number to another, records both by telegraph. We attempted to cook beans for supper, but ten hours of constant boiling left them still hard, and so we had to go to bed beanless.

November 21.—A very light snow fell during the afternoon, the snow-clouds hanging over the plains, much fringed at the lower ends, as seen when a heavy rain-shower is observed from a distance, but the fringes appeared to hang in mid-air, unable to reach the earth, being apparently dissolved on entering the warm and dry lower atmosphere.

November 22.—Snow commenced falling in the early morning and continued throughout the day, the fall being very heavy during the afternoon. There was little or no wind at day-break, but toward noon a brisk northeast wind set in, causing heavy drifts. The snow is of a very fine texture, very dry, and, like dust, penetrates through the smallest cracks in doors, windows, and walls. The depth of snow I estimated at 2 feet 6 inches, melted snow, 2, 6 inches, but the rain-gauge is very unreliable with winds and drifts.

Immediately after breakfast I sent out Smith to repair the line, which he did by 11 a. m. Returning, he encountered the very heavy snow-storm prevailing on the Peak, and lost the trail. He had to pick his way back over the rocks, and arrived here at about 1 p. m., nearly dead with cold and exhaustion. Duty on Pike's Peak is not fun. If any proof were needed that we are above ordinary circumstances, the astonishing boldness or tameness of our only companions, mice, would furnish that proof. Not only are they running about the office in broad daylight and getting under my pillow at night, but this afternoon a very intelligent-looking mouse got actually on the desk while I was writing, and almost allowed itself to be touched. While on the floor, Lemman threw it a few cheese-crumbs, which it devoured, sitting on its hind legs like a squirrel. These mice are of a light-brown color, having long ears and sharp, pointed noses, singularly expressive and large eyes, and are not nearly as repulsive-looking as their brethren of the lower regions.

November 23.—Snow ended during the night, and morning broke with a clear sky, but such heavy snow-drifts that one could hardly see six paces ahead. This continued all day, and in the evening so high and dense a cloud of snow-dust was raised by the very brisk northerly wind that the people of Colorado Springs took it to be smoke from a large fire, and inquired by telegraph if our house was burning.

Considerable free or atmospheric electricity manifested itself when the binding-screws of the relay were touched with wet fingers. A few mornings ago I accidentally touched the stove-pipe before a fire was built, and immediately a bright and long spark passed with a crackling sound between it and my fingers. No sparks could be drawn by repeating the touch.

November 24.—The wood-packers arrived this p. m.; the men were nearly frozen, and said they had been deceived by the mild, pleasant weather two miles below the summit, else they would not have attempted to come up here. Two of their "burros" froze to death Saturday night. The snow is over four feet deep on some parts of the trail.

Brown brought up our mail, a most welcome gift, as we have not received any in a week before.

A strange-looking animal jumped on the cross-bar of our instrument-shelter and looked through the window as if it wanted to come inside. It was nearly the size of a cat, with a long, bushy tail and mouse-colored pelt. Its head resembled that of a rat, but much larger. Before we could open the window the animal took fright and disappeared. I intend to set a trap for it.

Sergeant Sackett, who is encamped at the lake, telegraphed me to-night that in dipping water out of the lake he caught a shrimp. It has been often doubted whether this lake contains animal life; but that shrimp settles the question.

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November 25.—The woodmen, to whom I gave a description of the animal seen last night, pronounce it a rock marten.

November 27.—Thanksgiving Day, but no turkey on Pike's Peak. However, Smith baked some nice short-cake and dried-apple pies for dinner, which reminded us of to-day's importance. And while I am thinking that to-day the Christian world below gives thanks to the Almighty for the many blessings of the past year, I feel deeply that we three laborers in the field of science have also just cause to be thankful for His protection from the dangers of our position.

It seems to me that nature herself was doing her best to glorify the day, for a grander and more sublime spectacle than sunrise this morning, human eyes never beheld. The plains below us were covered with a dense mist, perfectly level, and the instant the first golden edge of the sun rose above it, this mass of vapor was converted into a swelling mass of liquid fire, while above dense, black, stratus clouds were driven with lightning speed before the gale, their lower, ragged surfaces being dipped into and reflecting the glory as they sailed to the eastward.

Weather cold and damp throughout, with a continuous gale from the southwest and west. Far below us to the east a perfect sea of stratus and cumulus clouds spread itself over the prairie and lower mountains, while threatening-looking detached masses of snow-clouds swept over the summit, at times enveloping us with a pall of frozen vapor.

Mr. Raymond, the carpenter, arrived here this p. m., as well as the provision-train, bringing the new instrument-shelter and stove-top, also a most valuable present for me from a kind-hearted young lady at Colorado Springs, a lively female kitten, which felt at home immediately on being released from Lemman's overcoat pocket, where it had made the journey.

Mr. Raymond, who had never been on the summit before, severely felt the effects of our rarefied atmosphere, and staggered about like a drunken man. Our provisions are now all up, and I think all the wood we are going to get this winter, for the woodpackers have broken up camp and returned to Colorado Springs, although about fourteen cords of wood are due, according to the contract. But the severe weather of the past week makes it almost impossible to continue the work. On their last trip the men, strong and hardy mountaineers as they are, were almost crying when they came in to warm themselves, so severely did they suffer from the cold.

November 30.—Our cat caught its first mouse to-night, and something like a rat was crushed to death in the steel trap outside. The main difference between the "victim" and the common rat is in the tail, which is of nearly equal thickness throughout and covered with fur, the same as the rest of its body.

The principal meteorological features of November were: a spell of very mild and pleasant weather, with light winds between the 2d and 15th, inclusive; a hurricane from the north and northeast, with snow and low temperature on the 17th and 18th; a heavy snow-storm on the 22d, and a continuous westerly gale from the 25th to the end of the month.

DECEMBER, 1873.

December 1.—Another rat (?) was caught in the steel trap this evening; they are very curious-looking animals, and I would scarcely call them "rats," only they resemble rats more than any other animal I know of.

December 2.—The summit was constantly enveloped in a dense cloud of frozen vapor, keeping the humidity at saturation, and never once lifting.

December 3.—Although this has been a terrible day, and I should not have thought it possible for any human being to brave the great cold and violent drifts for any length of time, yet Smith, who had stayed at the lake cabin all last night, started for the summit this morning, not knowing how cold it really was, nor how blinding the snow-drifts above timber-line. I certainly did not expect him, and was horrified when at about 3 p. m. Smith staggered into the house more dead than alive, looking like a walking pillar of snow and ice. His left hand was badly frozen, and although I immediately rubbed it with snow, and succeeded in restoring the greater part of it, yet the ends of his fingers were too far gone, and he will doubtless lose part of them. The poor fellow had sought shelter at the wood-camp, but found it all snowed up, and so was compelled to continue his journey. He suffered agonies during the evening and night.

December 5.—Lemman saw the fresh tracks of a bear to-day; being unarmed he was more pleased to see the tracks than the bear himself.

December 7.—This has been a long, dreary day indeed. The summit was enveloped throughout in a dense cloud of frozen vapor, cutting off all view beyond the distance of a few yards, while heavy snow and sleet fell at short intervals during the day and night, drifting in deep banks around our door by the strong southwest wind.

NOTE.—I am informed by an observer at Colorado Springs that the "summit" was enveloped by a small, well-defined cumulus cloud, while the rest of the sky was entirely clear during Sunday.

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The air was heavily charged with electricity from 2 to 3 p. m., (at which time it was snowing and sleeting.) My attention was first attracted by the working of the relay. Thinking that the line was fixed, I hastened to adjust the instrument, but the severe shock I received convinced me that something stronger than our battery had charged the wires. I cut out the instrument and screwed the lightning-arrester closer, and in a few minutes a continuous stream of electricity passed between the two plates of the arrester, with a loud noise, resembling that produced by a child's rattle. The electric fluid passed, not in sparks, but in five or six continuous streams of light as thick as a pencil-lead, for two or three minutes at a time, with short intervals between.

December 9.—A short distance below the summit, I witnessed the interesting sight of clouds being rapidly formed and dissolved again as the humid southwest wind ascended and passed over the Peak. The sky was clear, but within a few hundred feet of the highest ridge small, fleecy clouds would suddenly form, increase in size until they were just over the summit, and then disappear again as they passed down the opposite slope. This happened between 11 a. m. and 1 p. m.

December 10.—For several mornings past I have noticed a sheet of clouds stretching over the valley of the Arkansas, southwest of the Peak, which to me seems to rest on the plains, but which probably have an elevation of some 1,500 feet. These clouds disappear toward noon. The mountains west of the Peak are generally capped with cumulus clouds, apparently stationary, but no doubt in constant transformation.

December 14.—Captain Allen, of Colorado Springs; Mr. S. B. Minshall, of Mount Pleasant, Henry County, Iowa, and Private Smith arrived here after 2 p. m., having been under way five hours between the lake and summit. An ordinary good walker ought to make the trip in three. They saw plenty of deer and mountain-sheep, coming up, also tracks of mountain-bison. Sergeant Sackett sent me one of the most beautifully-colored birds I ever saw; it was killed near the timber-line. Will send it to Captain Howgate, together with one of our curious rats. Captain Allen and Mr. Minshall proved to be very genial company, and I spent the evening more pleasantly than any other since I have been up here.

December 17.—Sackett telegraphed me last night that he caught a water-bug in the lake, and says he will bring it up to-morrow.

All of our reports are published in full in papers and magazines. The Gazette pertinently asks: "Did any one feel thankful on Thursday (Thanksgiving) that they were not signal-officers on duty at the top of Pike's Peak?" Yes. Well, we were thankful for our good stove, and didn't envy your comforts in the least, Mr. Editor.

December 20.—A most wonderful and novel sight met my astonished eyes on opening the door this morning; the plains had disappeared, and in their place there was, as natural as could be, the ocean, with rolling billows and spray dashing against the rocks of the mountain's base, which mountains had the appearance of towering islands. But the most striking effect was produced by the rigid immobility of the whole picture. Imagine the ocean stirred up by a stiff breeze and then, by some magic, to be suddenly turned into ice, billows, spray, and all, and you have an idea of what I saw. To make the whole as deceiving as possible, the cañons, gullies, and ravines below were all filled with a level sheet of clouds, as if the water had flown into them and turned to ice with the main body. All this wasm any thousand feet below us; the cloud could not have over 1,500 or 2,000 feet elevation above the plains, and between them and the summit the sky was clear, but far above us stretched forth an unbroken sheet of cirro-stratus clouds which obscured the sun, and prevented his rays from falling on the "frozen sea" below. This lasted for several hours, but as the sun got higher the clouds began to lift, losing their fantastic shapes, while the upper stratum appeared to descend, the mixture giving rise to light snow, which commenced at 11.30 a. m.

I have seen a bird on the very summit. In color and shape it much resembled the European sparrow, but its body had more roundness than that of any other bird I know of. It looked as if ready to burst.

December 23.—To-day, at 4.15 p. m., I observed a strange and beautiful phenomenon. To the south and west, pictured on a cloud, was a portion of the snowy range, lying far to the westward. So realistic was the representation that one could scarcely realize that actual mountains did not extend (as seemingly) into the sky. The phenomenon was of short duration.

December 24.—Smith reached the summit at noon, having stayed alone at the lake cabin last night. He says that he heard a suspicious noise around the cabin during the night, but did not think much of it until the following morning, when he found tracks of a bear all around the cabin.

When he reached the timber-line this morning, he saw a mountain-bison not more than a hundred yards distant; the animal at first exhibited an inclination to make closer acquaintance with Smith, but thought better of it, and walked off, to the great relief of Smith, who had no arms with him, and, beside, is crippled in one hand.

December 25.—Christmas; and a dreary one, indeed, despite the many "Merry Christmases" wished us over the telegraph-line. The wind continued very high from

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the northwest, and increased to a heavy gale after sundown, which made the heavy rocks on our roof roll about like so many pebbles, and forced the fine snow-dust through the smallest cracks in door, windows, and roof. By keeping the stove at red heat, and sitting close to it, we managed to bake on one side and freeze on the other. The principal meteorological features of December were: 1st. Frequent snow-storms, high westerly winds, low temperature, and great humidity, during the first half of the month; in one instance the thermometer fell to —26°, the barometer also reaching a minimum height of 29.18 on the same day, (3d instant.) 2d. Moderate wind and temperature and fair weather to the 24th. 3d. Heavy gales, backing from north to west, with comparatively high temperature, low humidity, and fair weather during the remaining week.

JANUARY, 1874.

January 1.—The new year opened very promising, with a clear sky and mild temperature, but the wind still blowing a stiff breeze from the west.

January 2.—It was hard to tell when day commenced or night ended, or *vice versa*, for a cloud of great density rested on the summit throughout, the frozen particles of which were deposited on everything, the telegraph-line appearing like a huge white snake, several inches in thickness, twisting and writhing under the influence of a stiff breeze.

January 4.—Yesterday's storm was undoubtedly the heaviest of the season. On the northwest side of the Peak a mountain of snow was accumulated, at least a hundred feet in height, and the trail is entirely obliterated.

January 10.—At 4 p. m. I observed two peculiar bands of cirri, stretching across the entire heavens, a little north of the zenith, from west-northwest to east-southeast, converging at the horizon, and having a breadth of about five degrees near the center. The particles of clouds composing them were rapidly moving in the direction of the bands, but the bands themselves seemed to be stationary until obscured. Their appearance resembled very much the illustration given in Plate VII, Instructions to Observer-Sergeants, viz: Compact, rounded masses (cirro cumuli) in the center, interwoven with long, delicate fibers, which also formed the well-defined edge of the bands. During the presence of the bands the sky north of them was clear, while to the south an almost unbroken sheet of cirro-stratus clouds was to be seen.

January 11.—A "lunar halo" was observed at 5.42 a. m., the sky being covered with cirro-stratus clouds, while far below the breaking day revealed a "perfect sea" composed of an unbroken, level sheet of dense, whitish clouds. This mass of vapor filled all ravines and cañons, covering the lower ridges and peaks, while the higher ones rose above it like islands in the midst of the ocean. It was a very picturesque sight, and remained unchanged all day. The base station reported "light snow."

January 12.—Saw another little bird on the summit to-day, of the same species as the one I had seen before. I guess they are snow-birds.

January 14.—As usual, of late, the clouds hung over the Arkansas Valley, completely obscuring it from view. Looking down on the spot from here, it resembles nothing so much as a spacious bay or estuary; the cloud-covered plains, in their bluish-gray color and level, placid surface, bearing a not inapt resemblance to the mighty ocean itself, and the shifting and rolling of these cloud-billows, at times, renders the illusion almost perfect.

January 16.—Another fair day with brisk wind from west, that increased to a heavy gale of fifty miles by 9 p. m., and with fierce persistency kept howling and roaring like some mighty monster over the summit, as if seeking for its prey. For a while it took quite a hold on our roof, and, notwithstanding the ton or two of rock piled thereon, I gave it up for lost more than once. But the wind moderated somewhat by midnight and I breathed freer, although I passed a sleepless night.

January 17.—During the latter part of the afternoon a cloud enveloped the summit, so dense that not a rock could be seen 10 feet from the doorway, and reminded me of nothing so much as a London fog in November, only the London "particular" is far from being as cold as our visitor. I stood in one place; the house, not ten yards to my left, had disappeared in the mist like the Phantom Ship; around me, in a radii of 10 feet, rough, frost-speckled rocks; beyond and above this line, nothingness.

I must not forget to mention that this morning, at 5.30 a. m., I saw on the summit, seated contentedly on a frost-covered rock, a bird somewhat larger than a blue jay, and too large for a snow-bird. It appeared to be of a dark-gray color, but that may have been owing to the illusive mist that hangs over the summit at early dawn. I hurried in to get the carbine, but when I came out again the bird was *non est*. I was very sorry that I could not capture the *rara avis*—any species of feathered biped is that at this elevation in winter—but "what can't be cured," &c.

January 23.—A heavy gale from the northwest prevailed all day, causing most violent snow-drifts and effectually clearing the Peak of its white shroud. But few clouds were to be seen, yet so dense were the drifts as to entirely obscure the lower country; huge banks of snow accumulated on the outside of our doors, so that we could not shut them after they had been opened once, and had to use spikes and braces

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to keep them at least partly closed. It was a most disagreeable day, and made one sigh as occasionally we caught a glimpse of the warm, sunny plains below.

January 25.—A very pleasant day throughout; weather like this makes one almost forget it is an exception and not the rule, for no one can appreciate and enjoy such mildness more than we do, after weeks of piercingly cold hurricanes and snow-storms.

Our little snow-bird visits us regularly every day now, feasting on the crumbs around the house. It is quite tame, and I am pretty certain that it is one and the same bird that comes every day.

January 26.—The sky became partly overcast with cirrus and cirro-stratus clouds during the forenoon, which were at first observed to move from due south, but later in the day changed their course to southwest. This is quite an uncommon occurrence; usually the upper clouds move from west and northwest.

January 29.—This morning I found a large rat sunning himself on the door-sill without attempting to run when I opened the door. I inveigled him into the office intending to cage and tame him, but he died in a few hours. He was evidently a patriarch, one of the oldest inhabitants, and very likely died of old age, though his long ears showed signs of rough usage, as if he had been worsted in a family quarrel. He belonged to the species of "wood or mountain rats," with big head, long ears, and bushy tail, claw like a prairie dog, and immense whiskers. His fangs were fully three-eighths of an inch in length.

The principal meteorological features of January were strong gales, heavy snow, and low temperature during the first week, followed by generally cloudy weather, with frequent gales, until the 18th, when the heaviest snow-storm of the season occurred; light snows fell at intervals for several days afterward. The latter part of the month, with the exception of the last day, was characterized by generally pleasant weather, with moderately brisk to light winds.

All hands were more or less frost-bitten during this month; Private Cramer and myself pretty badly. Private Lemman had a severe attack of neuralgia; Private Boutelle is now seriously ill with inflammatory rheumatism. I myself suffered with diphtheria during the greater part of the month. Altogether, January has been rather hard on us.

FEBRUARY, 1874.

February 7.—The wind backed to the west during last night and increased to a stiff gale toward morning.

A strange phenomenon was observed at 9 p. m.; the sky appeared to be perfectly clear and the stars shone brightly, yet snow was falling fast in good-sized flakes; the wind had veered to the north, from which direction the snow-flakes were coming, and I was particularly struck by the fact that they did not appear to fall from above, but that their path made a sharp angle with the summit. This "snow from a clear sky" continued for some fifteen minutes, when the sky became overcast and the summit enveloped in dense clouds. Snow ceased soon afterward. Very probably the snow-cloud ascended the northern slope of the Peak, invisible to us, and the flakes were drifted in advance of the cloud by the brisk north wind then prevailing. This would also account for the peculiar horizontal direction of the flakes as mentioned above.

February 8.—This has been one of the few days on which we had reason to congratulate ourselves for being far above our fellow-beings at Colorado Springs, for while we on the summit enjoyed a very pleasant day, with a clear sky and bright sunshine, all the world below us, at least that portion of it which comes under our bird's-eye view, was covered with one grand ocean of whitish clouds, assuming all manner of fantastic shapes, and having apparently great density and vertical thickness. It was a fine sight, and I am sorry to say we enjoyed it none the less when Sergeant Fenton told me how damp and disagreeable it was below, and how it was snowing and sleeting.

February 13.—It is characteristic of southwest wind that clouds are formed immediately over and on the Peak during its prevalence. These clouds appear to be purely local, and, to an observer below, the summit is usually hidden by a small stationary cumulus cloud, which is frequently the only cloud visible to him.

February 14.—General E. A. Merritt, New York, and Mr. E. S. Nettleton, chief engineer Central Improvement Company, left the springs at 10 a. m., with Mr. Copley as guide, and arrived on the summit at 7.40 p. m. As the snow-drifts were violent and the cloud on summit very dense, they had a pretty hard trip from timber-line up. All were much frosted and exhausted on reaching the house, and, though professing to feel quite well in other respects, were soon passing through the various stages of Pike's Peak fever. Mr. Copley, who has been up here frequently, was the first to surrender his supper as a tribute to "Old Pike," and the others passed a wretched night, being unable to sleep and complaining of violent headache and nausea. I strongly suspect that if it were generally known what heavy penalties are attached to the glory of having ascended Pike's Peak, visitors would be pretty scarce up here.

February 15.—Our visitors remained more or less sick all day, but were nevertheless determined to enjoy all the fine sights and views which the Peak affords so liberally on

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a fine day. They were enthusiastic over the really splendid sunset and the usual realistic shadow cast by the Peak on the haze to the east.

February 21.—Complete lunar halo at 9 p. m.

February 24.—As a curious illustration of the rapidity with which water boils at this elevation, I will mention that this evening a dish-pan full of loose snow was set on the hot stove to melt, and in a very short time the water in the bottom of the pan began to boil, while the snow on top of it was yet some three or four inches deep. Thrusting my finger through the snow, I found that it had formed a solid crust above the boiling water; but even this was not sufficient to condense all the steam, which escaped with loud hisses through its icy confines.

February 25.—One of the days to be remembered. A gale from the southwest continued throughout, bringing back in indescribably dense drifts the snow which yesterday had been blown to the southward, and a great deal more in the bargain. The prevailing cold weather has rendered the snow very hard, so that the icy missiles, moving at the rate of forty miles per hour, inflicted severe pain on all unprotected flesh.

The principal meteorological features of February were:

Changeable weather, with occasional light snows, during the first ten days, followed by a week of cloudy weather, with much snow and heavy westerly gales.

A spell of very low temperature occurred between the 20th and 26th, and during the greater part of this time the summit was enveloped in dense clouds.

MARCH, 1874.

March 7.—At 9 p. m. I observed a faint whitish light on the horizon in a north-northeast direction from the summit. The light resembled an auroral arch, but was very indistinct, and had only a few degrees elevation above the horizon; no motions, such as streamers or "merry dancers," could be discerned. This is the first time that I observed anything like an aurora from the summit.

March 13.—A perfect sea of clouds overhanging the plains at daybreak, while above the Peak the sky was cloudless. This sea was violently agitated soon after sunrise, and its component vapors ascended to higher regions, forming the cumuli which surrounded the Peak during the greater part of the day.

March 22.—A very swift upper current from the southwest was observed at 4 p. m., the cumuli of small elevation sailed slowly before the prevailing wind, while far above them a number of delicate, well-defined cirro-cumuli were rapidly moving from the southwest.

March 23.—At night, as the fleecy clouds passed swiftly across the moon, they produced, successively, coronæ of exceeding beauty, often exhibiting three different series of colored circles.

The characteristic meteorological features of the month of March were: Much cloudiness, great humidity, and frequent light snows, especially during the middle and latter part of the month. Southwest winds predominated to an unusual extent. The mean temperature is lower than might be expected from the spring month, being about equal to December and below that of January. Two great barometric depressions occurred during the month, culminating on the 5th and 16th, respectively, accompanied by low temperature and snow, and followed by strong gales as the pressure recovered.

APRIL, 1874.

April 9.—Never, during the whole winter, has there been such an immense quantity of snow on the Peak as at present, and it certainly looks as if the greater part of it could not melt before July or August.

April 15.—The quantity of snow deposited on the summit since yesterday exceeds by far any previous fall, and the aspect of the whole Peak is radically changed. Owing to the moderate winds which accompanied the deposit, the summit is now uniformly covered over with four feet of snow, whose glaring, level surface is broken only here and there by a bowlder of more than ordinary size. Immediately around the house the snow has accumulated to a bank over seven feet in height, being nearly level with the roof.

Fully two feet of snow fell to-day, and if a strong wind springs up before this immense quantity has time to harden, the fury of the drifts will be terrific.

April has proved itself the most disagreeable month since the opening of this station in November last.

There have been but nine fair days in the entire month, while snow or sleet fell on fifteen different days, and on the remaining six the summit was generally enveloped in dense clouds. The total amount of "melted snow" exceeds that of the past five months put together.

High winds were less frequent than during the winter months, so-called, with a corresponding diminution in the total monthly velocity. No remarkable barometric depression occurred; an area of unusually high pressure passed over us between the 25th

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and 30th instants, accompanied by very pleasant, mild, and dry weather. Heavy gales preceded and followed it. A remarkable feature of April has been the predominancy of more moderate northerly winds over the usually westerly gales. Snow-storms occurred most frequently with northeast or southeast winds instead of with a southwest wind, as during the winter months.

Formerly the winds usually changed between north and south by the west, while during April the most frequent change took place by the east, both in veering and backing. No other phenomena worthy of special remark were observed.

MAY, 1874.

May 2.—At night the summit was densely enveloped. The fury of the wind-squalls was terrific, and kept both Lemman and myself awake, although we are well accustomed to the howling gale.

May 8.—In the afternoon and evening the wind blew in gusts of great force, which, as on yesterday, were much more severe on the southern slope than on the summit. On the south edge of the summit-plateau I found it altogether impossible to stand up against the wind, and turning to retrace my steps, I was violently hurled to the ground, or snow, rather.

May 9.—Winter has resumed full sway, and to-day's weather would have done credit to January. In the early morning the sky was nearly cloudless, but soon after 7 a. m. the summit became enveloped, and sleet commenced to fall at 9 a. m., continuing at intervals throughout the day and night.

A high southwest to west wind prevailed in the morning, which veered to the northwest during the forenoon, and increased to a stiff gale in the evening.

Private O'Leary, who left the summit on the 27th ultimo, arrived here quite unexpectedly at 11 a. m., in company with a Mr. Sanders.

It appears that much anxiety was felt by the good people below on our account, and O'Leary states that prayers were offered in our behalf at different churches before his arrival.

May 11.—The rumbling of distant thunder was heard at and after midday, but no lightning could be seen. At the same time the wire became so strongly and steadily charged as to deceive me into the belief that the line had been repaired. For about ten minutes I could make plain signals with the key, and during the entire day severe shocks were felt by any one touching the wire.

May 14.—At 10 a. m. the wind veered to the northwest, from which quarter black, threatening, cumulo-stratus clouds advanced rapidly, heaving and rolling like genuine thunder heads. Sleet began to fall as soon as they reached the Peak. For three hours the summit remained densely enveloped; at 12 noon it hailed very heavily, the stones being as large as peas, and of soft white snow throughout, without any nucleus. The thermometer fell with the beginning of the storm and did not rise again after it had passed over.

May 21.—Near the summit I found several small bugs on the snow, and among them a lady-bug, of a dull straw color, which I preserved for Professor Baird. The weather clouded over toward midday, and hail and sleet fell at short intervals throughout the afternoon and evening, accompanied by thunder and lightning. A flash of fire about two feet long leaped from the lightning-arrester into the office, illuminating the room but doing no damage. Thunder and hail clouds passed above and below the summit. Fair weather with fresh north winds at night.

May 20.—Sleet fell, accompanied by thunder and lightning. The afternoon report could not be sent. The lightning-arrester kept up a continual fizzing during the afternoon.

May 22.—Summer appears to have commenced at last even on Pike's Peak, for throughout to-day the thermometer stood above 30°, and reached a maximum of 42° at noon. Base-station reports a maximum of 93°.

Two thunder-storms passed below the Peak, both advancing from the northwest to the south and east and disappearing in the northeast. Sunset was extremely beautiful; rose-colored streamers like festoons extended from clouds to plains in fantastic combinations, exhibiting splendid contrasts of light and shade.

May 24.—A heavy thunder-storm passed slowly and directly over the Peak between 10 a. m. and 3 p. m.; the temperature declined during its passage, and large sparks passed constantly through the lightning-arrester, while a strange crackling of the snow could be heard at times. While making the 2 p. m. out-door observation I heard the snow crackle as mentioned, and at the same time I felt on both temples, directly below the brass buttons on my cap, a pain as if from a slight burn; putting up my hands, there was a sharp crack, and all pain had disappeared.

May 29.—A violent thunder-storm, accompanied by sleet, passed over the Peak from south-southeast to west-northwest. It came upon us so suddenly, that I had barely time to cut out the telegraph-instrument before blinding flashes of fire came into both rooms from the lightning-arrester and stoves; loud reports followed in rapid succes-

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sion, while outside the noise of thunder-claps was almost drowned by the rattling of the indescribably heavy showers of sleet which followed each discharge. The storm appeared to surround us in all directions. At 7 p. m. a bolt struck close to the north window, and at the same time a heavy discharge took place through the lightning-arrester, which made me for a moment believe that the building itself had been struck and was on fire; a cloud of smoke filled the embrasure of the north window, which was afterward found to have resulted from the melting of the rubber-insulation on the office-wires. On account of the smallness of the office-room, I considered it safer to retreat to the kitchen, when I found both assistants about to run, under the belief that the house was on fire. After this discharge the storm passed slowly to the westward, and we were already beginning to breathe more freely, when the wind veered to the southwest and brought back the storm in all its fury.

The rattling of torrents of sleet, mingled with the incessant rolls of thunder, the blinding flashes and loud reports in the room, were enough to make the stoutest heart quail. The storm continued until 8.10 p. m., when it disappeared in the northeast, and sleet was succeeded by heavy snow.

The principal meteorological features of May were greatly increased temperature and pressure; numerous thunder-storms, with heavy showers of sleet and wet snow; and more variable winds than usual, especially during the middle and latter part of the month. The first thunder-storm of the year occurred on May 11; between the 18th and 31st they were of almost daily occurrence, generally advancing from southwest to northeast, and passing above and below the summit. Much sleet and snow fell on the 29th, 30th, and 31st. From the 8th to the end of the month more or less sleet fell on nearly every day, the weather generally clouding up toward noon and clearing again in the evening. Atmospheric electricity made itself frequently and uncomfortably felt by discharges through stove and lightning-arrester.

JUNE, 1874.

June 2.—At 2.30 p. m. storm-clouds advanced, with a violent whirling motion, from a point south and east of the summit, and close over the mountains surrounding the Peak in that direction. The vortex crept slowly along the eastern slope of the Peak, and the clouds were hurrying toward it from all directions; thus, over the summit they moved from the west and northwest, south of the summit from southwest and southeast, and north of it from the northeast and north; the whole mass revolving "against the sun." At the same time the clouds had a strong downward tendency, while from the center of the vortex dense whitish masses of vapor poured upward like volumes of smoke. Thunder and lightning accompanied the storm, and heavy showers of sleet fell on the summit. The wind during and after the storm blew steadily and briskly from the west. At night the weather cleared up, but continuous silent lightning illuminated the entire eastern horizon.

June 5.—At 10 a. m. we were surprised by the arrival of two strangers—visitors they proved to be—a Dr. Peter Julian, from Kansas, and Mr. Hayslip, from Colorado Springs. After taking a view from the summit, and partaking of a "high" dinner, they left us "in peace."

June 6.—First Lieut. A. W. Greeley, inspecting-officer, accompanied by Mr. Copley, arrived on the summit at 10.30 a. m. Mr. Copley returned to the lake at 2 p. m., while Lieutenant Greeley remains to inspect the station. The weather remained clear until evening, when a very dense smoke obscured south and east, and rose to some distance above the summit. Faint auroral streamers, extending some 40° above the northeast horizon, were observed at 9.30 p. m., while directly beneath them the usual sheet-lightning flashed incessantly. No trace of the aurora remained at 10 p. m.

June 7.—Two strangers paid us a visit this noon; they remained but a few hours.

June 8.—Returning to the summit, I collected a great many bugs, spiders, and flies, also a large humble-bee, near the house. All of these insects I found more or less benumbed on the snow, the southwest gale of the past few days having very likely carried them up here from lower regions. Two gentlemen and quite a small boy made the Peak this p. m. from Manitou, via old trail, returning again after a short survey of the summit. They stated that several others were coming behind them, but these seem to have given out before reaching the goal. The boy stood the trip like a regular.

June 9.—Lieutenant Greeley, after inspecting instruments, books, property, &c., this morning left the summit at 9.15 a. m., following, or at least intending to follow, the old trail to Manitou.

June 10.—I collected several varieties of small flowers and plants at an elevation of 12,500 feet and below.

June 12.—A gentleman and "Sam," the guide, visited the station this p. m., via old trail. Two others came up on the new trail, rough-looking customers, who vented their feelings in a savage whoop as soon as they reached the summit. I thought

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"Injuns sure," and looked after carbine and revolver, but they turned out to be a well-disposed Scotchman and a taciturn Missourian, both laborers, apparently.

June 15.—A party of visitors attempted the Peak via old trail, but only one of them reached the summit with the guide.

June 16.—Spectrum colors were seen at sunset on some of the cloud streamers over the plains.

O'Leary arrived here at 6 a. m., with some butter and sugar, and accompanied by four gentlemen; another party of five gentlemen arrived soon afterward from Manitou. They were all from the clergymen's convention at Saint Louis, and stated that several others had given out before reaching the summit. Shortly after they had left, Mr. Copley and two gentlemen from Colorado Springs put in an appearance, verifying the old saw, "it never rains but it pours."

June 17.—Two visitors from Manitou, with guide, arrived here at noon. Dinner being on the table, I invited them to join us, but our spread-out—beans, tea, and bread and butter—found little favor in their eyes. Lemman shot a large cony this morning about ten yards from the house. His skin will be saved for Professor Baird.

June 18.—A solitary visitor gladdened our hearts this morning; a second one did not have breath enough left for the last half-mile, and stayed below. One of Mr. Copley's men repaired the trail near the summit to-day.

June 19.—Two Boston gentlemen, editors, with guide, paid us a visit this noon; two more visitors arrived soon after them, all via old trail.

June 20.—Four visitors to-day, among them, as a curiosity, a man with only one leg, who rode to within a short distance of the house. Flies and bugs are appearing in countless numbers.

June 21.—At about 4.30 a. m., Lemman and myself were roused by a rough and noisy crowd of seven men, who had come up here to see the sun rise. They were too late for old Sol, however, and departed again at 7 a. m., much to our satisfaction. Messrs. Moody and Atwater, of Colorado Springs, arrived late this evening and remained over night; both suffered somewhat from Pike's Peak fever. As a curiosity, I may mention that a large butterfly disported himself about the summit this forenoon.

June 22.—To-day I found near the summit the first grasshopper of the season; I also collected from the surface of the snow quite a number of bugs.

A party of six visitors, with guide, arrived at noon via old trail. Mr. Guernsey, photographer, and assistant reached the station at 2.30 p. m., after taking a number of views on the new trail. Mr. Guernsey will remain a few days to take summit views.

June 23.—Mr. Guernsey took some very fine views of the station to-day. Three visitors this noon; a fourth solitary pleasure-seeker roused me out of bed at 10 o'clock to-night, and asked for sleeping-room. He spread his blankets on the floor, where it is to be hoped he enjoyed Pike's Peak to his heart's content.

June 24.—Fourteen visitors to-day, mostly Texans, and a few Kansas City men. They came, one or two at a time, up the old trail, and most of them were well fagged out. Our mysterious visitor of last night got up this morning before day-break and left without a word. None of us had seen his face or learned his name. Mr. Guernsey started for Colorado Springs this forenoon.

June 25.—Only two visitors to-day, both tourists from Manitou. Day opened clear, with a fresh southwest gale, which moderated to brisk velocity during the forenoon.

June 26.—Six visitors to-day, besides Mr. Nettleton, surveyor, and assistant, who are taking elevations, and arrived on the summit this evening.

June 27.—Mr. Nettleton finished his measurements to-day. Starting from the bench-mark of the Denver and Rio Grande Railroad at Colorado Springs, he has measured with the spirit-level the elevations along the entire trail between said bench-mark and the highest rock on the summit of Pike's Peak. This rock sits about 100 feet northwest of the house, and Mr. Nettleton found its elevation to be 14,092.6 feet above sea-level. The elevation of railroad bench-mark at Colorado Springs is 5,935.6 feet. Height of summit of Pike's Peak above bench-mark, 8,157 feet. Providing the bench-mark is correct, this measurement is undoubtedly the most accurate one ever made of any peak in the Rocky Mountains. Mr. Nettleton is an engineer of acknowledged ability.

Three visitors this morning, in spite of the heavy gale. They had camped over night a short distance below the summit, and were more dead than alive when they reached the house from the combined effects of the gale and the cold. One of them was utterly unable to articulate for some time after his arrival. A fourth had sense enough to turn back without undergoing the miseries of the last mile.

June 28.—Mr. Nettleton and assistant left the summit at 8 a. m., after taking, at my request, the accurate angles of all prominent peaks in the main range. Going down, he measured length of trail from summit to railroad depot at Colorado Springs, and to-night sent me by telegraph the distances in feet of all prominent points on the trail. From the railroad depot to this station, via Government trail, the distance is 17.47 miles.

June 29.—Two visitors on mules made the summit at about 3 a. m.; not wishing to disturb us at such an early hour, they remained outside until 5.30 a. m., by which time

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the frosty morning had rendered them almost speechless. They didn't think much of sunrise on Pike's Peak.

June was characterized by generally mild and pleasant weather, with a few very local thunder-storms and accompanying showers of sleet.

The barometer was unusually high throughout the month, and was observed to rise and fall pretty regularly, with a rise and fall of temperature. The relative humidity shows a decided diminution, as compared with preceding months. High winds were frequent; very heavy gales prevailed from the 3d to 10th instant, and on the 27th instant. I have closely watched the beginnings and progress of the local storms which were so frequent during the latter part of May, and not uncommon during June, and have found that the great majority of them originated over the extensive parks west, southwest, and northwest of this peak, and dividing it from the main range. The lower strata of air become powerfully heated, and are probably at this season of the year, when the surrounding mountains discharge their melting snows into the parks, heavily charged with moisture. The usual cold, heavy west winds descending the eastern slope of the main range, and wedging under the heated, moist, lower strata, might explain the frequency of our local storms during the hottest part of the day.

Bugs of all kinds, flies, and spiders are very numerous on the summit. Since the middle of June I have collected a number of specimens from the surface of the snow, where they can be found in great abundance, all more or less benumbed. They are probably deposited there by ascending winds. Grasshoppers have also put in appearance; they are said to be quite numerous during summer.

Several varieties of delicate and very beautiful flowers can now be found on the summit plateau; the southern slope is in many places literally covered by them. Ninety-one persons have visited this station during June. No lady visitor has gladdened our hearts as yet. The great majority of visitors are sick when they reach the house; *a free use of whisky as a stimulant in climbing is a fruitful source of indisposition.* A cup of tea is generally acknowledged by visitors to be the best thing they had tasted for a long time, and relieves Pike's Peak fever.

Sunrise parties come here at 2 or 3 o'clock in the morning, and generally don't care a straw about sunrise if they can get into the house and hug the stove.

JULY, 1874.

July 1.—A heavy thunder-storm passed over the summit, from southwest to northeast, between noon and 2 p. m., and sleet of remarkable size fell during its progress. The stones were of hard snow, without nucleus, and many of them as large as a pigeon's egg. Violent cloud-whirls were observed before the beginning of sleet, the wind backing to the southeast, with falling temperature. A party of visitors were caught in the storm not far from the summit, and stated that they all experienced peculiar burning sensations on face and hands, and heard a hissing sound proceeding from hair and whiskers. The comet is plainly visible from here with the naked eye.

July 3.—Went to the lake this morning and collected a number of water-bugs and leeches. Three visitors to-day, among them the first lady of the season, Miss Penelope E. Ambler, of Mount Pleasant, Iowa.

July 5.—Extensive fires are raging among the foot-hills northwest of this peak, and the lower atmosphere is filled with smoke and haze.

July 9.—Small storm-clouds passed the eastern slope of the Peak between 2 and 3 p. m., treating us to the first rain of the season, in very light and short showers; but these were only forerunners of a heavy thunder-storm. Countless numbers of mosquitoes made their first appearance to-day, much to our annoyance. I had not expected to see these little pests on Pike's Peak. Mr. Copley, who is repairing the line between lake and summit, telegraphed me this forenoon that he twice got knocked down by electric shocks while splicing the wire.

July 12.—Five visitors to-day, among them Dr. H. Lindeher, a Swedish professor, from Stockholm.

July 16.—A very severe thunder-storm passed over the summit between 1 and 3 p. m., accompanied by mixed rain and hail. Sharp flashes and reports came through the lightning-arrester, to the terror of several lady visitors; outside of the building the electric effects were still more startling. The strange crackling of the hail mentioned before was again heard, and at the same time my whiskers became strongly electrified and repellent, and gave quite audible hissing sounds. In spite of the cap I wore, my scalp appeared to be pricked with hundreds of red-hot needles, and a burning sensation was felt on face and hands. Several of the visitors who were outside at the time experienced the same effects. A large dog who had followed his master out-doors became terrified, and made for the door with a pitiful howl.

July 19.—Maximum temperature 45°. A severe thunder-storm passed close over the Peak between 1.30 and 2.30 p. m. The lightning struck the telegraph-wire between the second and third poles from the house, and for a moment the wire resembled a rope of fire, and vibrated violently for some minutes after the discharge, but no damage was

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done. Frequent loud discharges took place along the ground-wire, between it and the rocks on which it rests. Hair and whiskers of any one out-doors were electrified by each discharge.

July 20.—Mr. Louis Nell, chief topographer of Lieutenant Wheeler's exploring expedition, arrived this evening with one assistant. They are to remain here until favorable opportunities offer for taking the angles of the most prominent peaks in the main range, in order to continue their triangulations.

July 21.—Heavy hail began to fall at 2.05 p. m.; the stones varying in size from one-tenth to four-tenths of an inch in diameter, mostly composed of solid transparent ice. One of the heaviest thunder-storms of the season advanced upon the Peak from the northwest, and appeared to remain stationary on the summit until its fury expended. The hail came down in continuous torrents until 7.30 p. m., and was succeeded by light rain. The lightning was terrific, and the heavy crash of the thunder was heard simultaneous with each flash. Not only did the constant crackling of the fallen hail indicate the highly electrified state of the summit, but from the very rocks proceeded a peculiar clattering noise, as if they were shaken by subterranean convulsions. Heavy flashes and loud reports came through the arrester in quick succession, and although I had opened the key, the lightning jumped the space and worked the relay until I took all wires off it.

July 23.—A large prairie-fire could be seen at night, due east from the summit.

July 31.—A very interesting optical phenomenon was observed during the magnificent sunset this evening; a sunset the beauty of which it is beyond the capability of my pen to describe. A light rain was falling on the summit, while in the west the sun was just about to disappear behind the Snowy Range in an almost clear horizon. To the east from foot-hills north and south a magnificent rainbow spanned an arc of fully 270° or three-fourths of a circle. White, fleecy clouds passed inside the arc from south to north, and on them was depicted a very accurate shadow of the house, with chimneys and parapet complete. Had one of us been on the roof, his figure and motions would have been faithfully copied on these clouds.

July was remarkable for a very steady and high barometer, unusually light and variable winds, and frequent severe thunder-storms. The latter occurred on seventeen different days, and often two or more during one afternoon. The wind was generally observed to blow toward the storm in the beginning, and from the storm as it approached and passed the Peak. The lightning made itself frequently and disagreeably felt in the office through the telegraph-wire, and out-doors by a peculiar burning or pricking sensation on face, hands, and scalp, accompanied by hissing sounds. It is my honest belief that sooner or later this station will be injured if not destroyed by lightning, and any one who has witnessed one of our severe electric storms will arrive at the same conclusion. The first rain of the season fell on the 9th instant, and light showers of it were frequent after that date. Quite a heavy snow fell on the 26th; light showers on the 28th.

Two hundred and ninety persons visited this station during July, including fifty ladies. They generally arrive in large parties and crowd at once into the small office, to see which appears to be the sole object of most visitors. To accommodate such wholesale invasions I have four serviceable chairs and barely room enough to place them. To make observations or to do any kind of work while such an invasion lasts s one of the most difficult and unpleasant tasks I have ever been called upon to undertake.

AUGUST, 1874.

August 1.—At night a dense cloud rested on the Peak, incessantly illuminated by brilliant though silent lightning. At 9 p. m. light rain began to fall, and at 9.46 p. m. torrents of large hail poured down with a noise that made sleep impossible; the lightning became very sharp, and thunder was heard occasionally, but only in short and feeble peals. Hail ceased at 10.45 p. m. as suddenly as it had begun.

Two eagles alighted not far from the house this forenoon, but were not accommodating enough to wait until I could bring a gun to bear on them. One of them was very large.

August 3.—The barometer continued to rise until 10 a. m., but fell steadily thereafter. Day opened cold and cloudy, with a fresh southerly wind; sleet began to fall at 2.05 p. m., and throughout the remainder of the day and night more or less heavy showers of hail, rain, and snow followed each other in quick succession. A heavy thunder-shower passed over the summit between 2.45 p. m. and 5 p. m., affording the novel sight of heavy snow with thunder and lightning. A heavy wet snow fell also late at night.

Fenton informed me that a water-spout had bursted over the Colorado Divide, and that all bridges had been washed away at Colorado Springs. The lightning rendered the line almost useless the entire afternoon. I got severely shocked when sending my report.

August 8.—Professor Gardner, of Hayden's expedition, put in appearance to complete some work left unfinished from last year. He remains over night, with one assistant.

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August 19.—A dense smoke is still obscuring the plains. Six visitors, including some ladies, arrived this forenoon, though for what purposes I am unable to say, since one was unable to see 50 feet ahead. The novelty of a heavy snow-storm in the middle of August compensated them in a measure for the poor view, or rather no view at all.

August 27.—A few days past a graceful little ferret made its appearance on the Peak, and is now busily engaged in hunting conies, rats, and mice. It is quite tame, and comes into the office when we have no visitors, where it allows itself to be caught and handled without difficulty.

August, like the preceding summer-months, was chiefly remarkable for numerous local storms, though they were of less severity than those of June and July. Thunder-storms occurred on twelve different days, the majority of them passing below the summit. Rain, hail, and snow fell often during one and the same storm in succession. Quite a heavy snow-storm occurred on the 13th. Light to brisk winds predominated; fresh gales prevailed on the 4th, 10th, 18th, 25th, and 31st, but they were all of short duration. Three hundred and forty persons of both sexes have visited this station during August.

September 2.—At 5 p. m. the clouds enveloping the summit broke, disclosing a most beautiful view of an ocean of clouds far below us, above which the foot-hills rose like so many islands.

September 9.—Ten visitors to-day, among them "Grace Greenwood" (Mrs. Lippincott) and daughter, of literary fame.

September 28.—Surveyor Kellogg, of Denver, and two assistants visited the Peak for the purpose of locating it and the township to which it belongs.

September 29.—Some very pretty little birds of a dark color with white spots and in shape similar to swallows were seen about the summit. During the month the fluctuations of the barometer were quite steady, maximum daily range not exceeding .13 of an inch. It was steadily rising toward the latter part of the month. The temperature during the third week of the month was quite low, reaching as low a point as 13°; but the first and last portions of the month were comparatively warm, and the thermometer stood mostly above freezing during that time. Clear weather was prevailing during the first and last week of the month. A heavy snow-storm occurred on the 22d day of the month, which attired the Peak in a white robe to the depth of 2 and 3 feet. A few thunder storms were observed below the summit. Brisk and high southwesterly winds prevailed during the month.

The telegraph line was in good order during the month, and a few interruptions that occurred were promptly remedied.

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PAPER 7.

STATISTICS OF STATIONS.

Monthly and annual mean pressure—October, 1873, to September 30, 1874.

Stations.	1873.			1874.									Annual mean.
	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	
Albany, N. Y				30.091	30.117	29.903	29.972	29.864	29.882	29.931	29.956	30.036	.....
Alpena, Mich	29.998	29.967	30.042	30.089	30.129	29.997	30.087	29.959	29.926	29.934	30.022	29.988	30.011
Atlantic City, N. J				30.184	30.143	30.008	30.042	29.985	29.981	30.041	30.022	30.089	.....
Augusta, Ga	30.110	30.091	30.243	30.245	30.169	30.091	30.052	30.009	30.034	30.073	30.029	30.067	30.101
Baltimore, Md	30.125	29.997	30.171	30.186	30.149	30.018	30.042	29.972	29.970	30.011	30.023	30.081	30.062
Barnegat, N. J				30.185	30.159	30.020	30.012	29.907	29.892	29.944	29.937	30.015	.....
Boston, Mass	30.054	29.914	30.098	30.136	30.125	29.907	29.988	29.924	29.931	30.005	30.004	30.085	30.014
Breckinridge, Minn	30.021	30.033	30.095	30.120	30.121	30.098	30.043	29.847	29.776	29.839	29.886	29.897	29.981
Buffalo, N. Y	29.989	29.929	30.072	30.075	30.115	29.970	30.038	29.929	29.927	29.943	29.995	30.031	30.001
Burlington, Vt	30.029	29.916	30.096	30.118	30.154	29.912	29.996	29.907	29.900	29.953	29.984	30.066	30.002
Cape Henry, Va				30.125	30.080	29.865	29.965	29.752	29.930	29.979	29.956	29.995	.....
Cairo, Ill	30.118	30.054	30.173	30.165	30.130	30.070	30.033	29.980	29.980	30.002	29.974	30.048	30.060
Cape May, N. J	30.069	29.964	30.160	30.161	30.156	30.022	30.034	29.986	29.989	30.043	30.019	30.083	30.057
Charleston, S. C	30.105	30.072	30.234	30.245	30.167	30.087	30.061	29.984	30.012	30.058	30.038	30.058	30.093
Cheyenne, Wyo	30.030	29.997	29.893	29.843	29.816	29.809	29.931	29.944	29.981	30.098	30.079	30.062	29.957
Chicago, Ill	30.026	29.990	30.100	30.093	30.101	30.033	30.061	29.957	29.901	29.939	29.953	29.991	30.012
Cincinnati, Ohio	30.118	30.051	30.177	30.173	30.141	30.092	30.062	29.989	29.979	30.007	30.007	30.059	30.071
Cleveland, Ohio	29.971	29.913	30.061	30.050	30.074	29.986	30.007	29.929	29.939	29.939	29.974	30.009	29.987
Colorado Springs, Colo			29.916	29.876	29.821	29.811	29.949	29.936	29.963	30.077	30.062	30.042	.....
Corinne, Utah	30.131	30.173	30.095	30.070	30.028	.....	.....	.....	.....	.....	.....	.....	.....
Davenport, Iowa	30.045	30.012	30.109	30.121	30.114	30.057	30.048	29.925	29.905	29.947	29.949	30.013	30.020
Denver, Colo	30.077	30.060	29.975	29.929	29.870	29.888	29.998	29.981	29.995	30.111	30.091	30.076	30.004
Detroit, Mich	29.999	29.947	30.071	30.074	30.102	29.987	30.029	29.928	29.906	29.930	29.982	30.003	29.996
Dubuque, Iowa	30.016	30.009	30.086	30.193	30.106	30.043	30.058	29.937	29.910	29.923	29.970	30.004	30.021
Du Luth, Minn	29.936	29.981	30.010	30.077	30.071	30.012	30.041	29.946	29.873	29.881	29.963	29.920	29.972
Eastport, Me	29.980	29.746	29.942	29.974	29.918	29.742	29.932	29.899	29.888	29.997	29.980	30.066	29.922
Erie, Pa	29.995	29.924	30.072	30.054	30.099	29.985	30.021	29.924	29.914	29.931	29.980	30.016	29.993
Esconawba, Mich	29.953	29.957	29.999	30.064	30.089	29.991	30.071	29.941	29.870	29.898	29.996	29.952	29.982
Fort Benton, Mont	30.118	30.053	30.018	29.925	29.916	30.006	30.012	29.955	29.950	29.770	29.994	30.010	29.976
Fort Gibson, Ind. T	30.080	30.061	30.133	30.114	30.068	29.951	29.936	29.900	29.894	29.925	29.867	29.959	29.991
Fort Sully, Dak	29.993	29.983	30.105	30.045	30.013	30.008	29.920	29.737	29.681	29.766	29.813	29.879	29.912
Galveston, Tex	30.110	30.110	30.170	30.160	30.080	29.980	30.010	30.010	29.997	30.022	29.993	29.973	30.051
Grand Haven, Mich	29.979	29.947	30.056	30.083	30.105	30.017	30.067	29.958	29.927	29.941	29.989	29.998	30.005
Indianapolis, Ind	30.062	30.010	30.125	30.120	30.099	30.044	30.016	29.940	29.925	29.954	29.952	30.020	30.022
Indianola, Tex	30.140	30.142	30.192	30.187	30.100	29.993	30.036	30.033	30.015	30.051	30.018	29.994	30.075
Jacksonville, Fla	30.075	30.087	30.204	30.218	30.135	30.095	30.077	30.009	30.050	30.075	30.029	30.029	30.090
Keokuk, Iowa	30.039	29.998	30.101	30.104	30.090	30.039	30.009	29.892	29.880	29.909	29.903	29.976	29.995
Key West, Fla	29.995	30.076	30.124	30.146	30.112	30.086	30.074	30.004	30.054	30.072	30.010	29.980	30.061
Knoxville, Tenn	30.123	30.060	30.219	30.209	30.140	30.079	30.007	29.973	29.983	30.028	29.988	30.046	30.071

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Monthly and annual mean pressure—October, 1873, to September, 1874—Continued.

Stations.	1873.			1874.									Annual mean.
	October.	November.	December.	January.	February	March.	April.	May.	June.	July.	August.	September.	
La Crosse, Wis	30.050	30.057	30.130	30.148	30.138	30.085	30.079	29.943	29.896	29.921	29.979	29.992	30.035
Lake City, Fla	30.085	30.099	30.208	30.220	30.131	30.085	30.073	29.999	30.045	30.064	30.018	30.022	30.087
Leavenworth, Kans	30.054	30.024	30.128	30.117	30.107	30.010	29.999	29.865	29.843	29.886	29.854	29.958	29.978
Lexington, Ky	30.097	30.031	30.171	30.143	30.119	30.055	30.024	29.970	29.962	29.989	29.984	30.050	30.049
Louisville, Ky	30.093	30.038	30.168	30.160	30.110	30.060	30.014	29.951	29.939	29.965	29.947	30.026	30.039
Long Branch, N. J	.....	.....	.....	30.127	30.124	29.942	29.983	29.925	29.919	29.977	29.972	30.045	.....
Lynchburgh, Va	30.089	30.017	30.192	30.211	30.169	30.048	30.042	29.977	29.987	30.021	30.028	30.080	30.072
Marquette, Mich	29.955	29.959	29.993	30.057	30.090	29.990	30.071	29.945	29.880	29.898	29.999	29.928	29.980
Memphis, Tenn	30.130	30.320	30.212	30.195	30.141	30.082	30.044	30.009	29.996	30.023	29.989	30.045	30.098
Milwaukee, Wis	30.024	30.003	30.087	30.128	30.127	30.052	30.098	29.989	29.952	29.967	30.010	30.002	30.036
Mobile, Ala	30.121	30.124	30.216	30.214	30.127	30.079	30.063	30.030	30.037	30.054	30.017	30.025	30.092
Montgomery, Ala	30.120	30.118	30.248	30.231	30.147	30.085	30.054	30.018	30.026	30.053	30.011	30.045	30.095
Morgantown, W. Va	30.051	29.976	30.138	30.130	30.101	30.017	29.989	29.936	29.929	29.965	29.989	30.041	30.022
Mount Washington, N. H	30.070	29.637	29.815	29.815	29.759	29.702	29.834	30.028	30.139	30.276	30.252	30.288	29.968
Nashville, Tenn	30.122	30.070	30.198	30.193	30.123	30.069	30.017	29.979	29.979	29.998	29.973	30.057	30.065
New Haven Conn	30.053	29.953	30.138	30.174	30.158	29.975	30.024	29.959	29.958	30.023	30.026	30.108	30.046
New London, Conn	30.060	29.947	30.120	30.160	30.140	29.949	30.021	29.968	29.960	30.031	30.015	30.097	30.039
New Orleans, La	30.107	30.105	30.182	30.186	30.108	30.052	30.040	30.024	30.019	30.039	30.006	30.006	30.073
New York, N. Y	30.067	29.959	30.143	30.172	30.154	29.995	30.036	29.959	29.956	30.021	30.015	30.096	30.048
Norfolk, Va	30.089	30.013	30.204	30.219	30.179	30.052	30.054	30.008	30.022	30.071	30.038	30.094	30.087
Omaha, Nebr	30.020	30.065	30.117	30.104	30.084	30.048	29.991	29.845	29.812	29.860	29.845	29.943	29.978
Oswego, N. Y	30.016	29.929	30.082	30.099	30.142	29.966	30.036	29.931	29.945	29.956	30.014	30.055	30.014
Pembina, Dak	29.927	30.055	30.045	30.141	30.076	30.088	30.053	29.886	29.796	29.809	29.883	29.849	29.967
Philadelphia, Pa	30.073	29.992	30.165	30.193	30.174	30.022	30.053	29.982	29.990	30.030	30.032	30.100	30.067
Pike's Peak, Colo	.....	29.947	29.750	29.732	29.623	29.676	29.813	30.023	30.156	30.316	30.279	30.137	.....
Peck's Beach, N. J	.....	.....	.....	30.186	30.165	30.020	30.050	29.997	29.997	30.055	30.031	30.096	.....
Pittsburgh, Pa	30.040	29.970	30.112	30.112	30.110	30.023	30.017	29.946	29.935	29.955	29.987	30.003	30.017
Port Huron, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30.017	.....
Portland, Me	29.982	29.823	30.022	30.064	30.039	29.805	29.955	29.854	29.854	29.937	29.941	30.032	29.942
Portland, Oreg	30.245	30.174	30.033	30.017	30.093	29.984	30.116	30.037	30.101	30.071	30.065	30.06	30.083
Punta Rassa, Fla	30.025	30.105	30.161	30.187	30.133	30.104	30.097	30.026	30.073	30.086	30.030	30.016	30.087
Rochester, N. Y	29.998	29.893	30.071	30.066	30.118	29.949	30.018	29.907	29.918	29.935	29.990	30.028	29.991
Salt Lake City, Utah	.....	.....	.....	.....	.....	.....	29.941	29.885	29.898	29.981	29.942	29.983	.....
Sandy Hook, N. J	.....	.....	.....	30.163	30.153	29.982	30.030	29.960	29.961	30.020	30.010	30.073	.....
San Diego, Cal	30.010	30.055	30.080	30.078	30.093	30.080	30.080	29.980	29.939	29.963	29.943	29.905	30.017
San Francisco, Cal	30.041	30.079	30.034	30.100	30.063	30.050	30.097	29.998	29.967	29.959	29.966	30.012	30.022
Santa Fé, N. Mex	29.875	29.856	29.780	29.752	29.633	29.617	29.668	29.726	29.781	29.876	29.879	29.82	29.772
Savannah, Ga	30.115	30.100	30.240	29.245	30.167	30.091	30.074	30.016	30.051	30.080	30.036	30.058	30.106
Shreveport, La	30.134	30.107	30.190	30.171	30.100	30.015	30.015	29.996	29.983	30.013	29.964	29.912	30.050
Saint Louis, Mo	30.106	30.051	30.164	30.148	30.125	30.079	30.046	29.955	29.955	29.980	29.969	30.029	30.050
Saint Paul, Minn	29.963	29.968	30.045	30.073	30.082	30.030	30.003	29.860	29.797	29.842	29.892	29.908	29.955

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Squan Beach, N. J	.....	.....	.....	30.170	30.153	29.972	30.023	29.962	29.967	30.017	30.015	30.043	.....
Toledo, Ohio	30.016	29.985	30.100	30.092	30.122	30.030	30.056	29.937	29.943	29.971	29.963	30.018	30.021
Vicksburgh, Miss	30.190	30.160	30.268	30.241	30.150	30.068	30.063	30.063	30.044	30.078	30.054	30.040	30.121
Virginia City, Mont	.....	29.756	29.632	29.601	29.590	29.548	29.683	29.685	29.705	29.784	29.763	29.783	.....
Washington, D. C	30.041	30.005	30.176	30.188	30.178	30.039	30.054	29.985	29.983	30.021	30.027	30.046	30.068
Wilmington, N. C	30.008	30.046	30.214	30.226	30.169	30.082	30.063	30.008	30.046	30.069	30.065	30.066	30.092
Woods Hole, Mass	30.040	29.990	30.130	30.139	30.114	29.934	30.006	29.902	29.958	30.043	30.022	30.110	30.037
Wytheville, Va	29.881	29.790	29.973	29.962	29.909	29.863	29.811	29.787	29.809	29.832	29.828	29.895	29.862
Yankton, Dak	30.051	30.059	30.181	30.170	30.163	30.116	30.039	29.875	29.814	29.880	29.886	29.979	30.018

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PAPER 8.

Monthly and annual mean temperature—October, 1873, to September 30, 1874.

Stations.	1873.			1874.									Annual means.
	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	
	°	°	°	°	°	°	°	°	°	°	°	°	°
Albany, N. Y	.....	.....	.....	28.8	22.8	31.5	36.7	56.6	66.2	71.1	66.9	63.3	.....
Alpena, Mich	41.8	26.2	28	21.6	20	24.6	29.9	49.8	60.2	65.1	63.3	59.9	40.9
Atlantic City, N. J	.....	.....	.....	36	34.1	38.6	42.9	55.4	66.8	70.3	69.5	67.8	.....
Augusta, Ga	60.7	51.5	48.1	50.2	50.5	59	63.2	72.5	81.4	78.5	78.8	74.7	64.1
Baltimore, Md	44.2	41	40.4	39.1	37.3	43.7	46.9	63.1	75.9	77.3	72.8	69.9	54.3
Barnegat, N. J	.....	.....	.....	35.5	32.8	38.1	41.4	55.5	69.3	70.2	69.1	66.6	.....
Boston, Mass	53	33.4	32.9	31.2	28.3	35.3	39.1	56.1	65.8	72.2	67.7	63.8	48.2
Breckinridge, Minn	38.2	23.4	8	2.6	4.2	15.1	34	60.2	65.9	70.2	67.8	57.7	37.2
Buffalo, N. Y	48.5	30.6	31.9	23.1	25.4	30.3	34.2	52.4	64.3	69.4	67.9	65.5	45.7
Burlington, Vt	48.7	26.8	25.9	23.1	19.6	28.6	34.3	53.6	64.7	70.4	66.1	61.9	43.6
Cape Henry, Va	.....	.....	.....	44.9	42.9	46.7	51.7	65.5	76.2	76.5	73.8	72.0	.....
Cairo, Ill	53.8	45	40.9	39.3	40.1	48.4	52	70.2	79.7	81.3	78.6	71.9	58.4
Cape May, N. J	56.1	42.2	40.6	38.1	35.7	40.7	44.4	56	68.5	69.2	68.8	68.6	52.4
Charleston, S. C	63.9	54.8	51.4	52.1	51.5	59.9	67.7	71.4	81	79.3	79.1	75.8	65.6
Cheyenne, Wyo	42.5	40.1	27.6	30.4	22.9	28.9	39	56.6	65.2	71.8	68.6	54.2	45.6
Chicago, Ill	49.1	34.4	32.4	29.1	31.5	36.3	38.7	58.5	70.2	74.7	71.9	66.8	49.5
Cincinnati, Ohio	53.3	40.9	40.6	37.3	39	44.3	48.3	67.9	79.6	79.3	77.4	71.9	56.6
Cleveland, Ohio	51.2	36.6	36.7	32.7	31.2	37.1	39.4	59.6	70.4	72.4	70.2	66.9	50.4
Colorado Springs, Colo	.....	.....	26.9	30.3	25.5	34.5	38.5	58.6	68.9	73.2	70.3	56.7	.....
Corinne, Utah	45.6	40.5	21.4	25.2	21.7	.....	.....	.....	.....	.....	.....	.....	.....
Davenport, Iowa	48.3	34.6	29.7	23.7	25.9	34.7	41.6	64.5	73.2	78	74.4	65.5	49.5
Denver, Colo	45.2	40.6	22.4	31.5	24.7	36.4	43.1	61.9	70	76.1	73.0	59.0	48.6
Detroit, Mich	47.9	32.2	32.7	28.9	27.5	34.4	37.3	59	68.9	71.4	67.9	66.7	47.9
Dubuque, Iowa	46.6	31.3	28.7	21.2	24	33.6	41.7	65.3	71.7	80	74.2	65.5	48.6
Du Luth, Minn	43.5	24.5	19.7	13	16.3	23.8	32.8	50.2	57.8	67.9	64.0	59.4	39.4
Eastport, Me	49.3	29.2	25.6	25.5	20.9	29.4	33.4	47.7	54.7	59.6	59.2	56.3	40.9
Erie, Pa	50.7	34.5	35.1	31.6	28.1	34	37	57	69.6	72.7	71.4	69.4	49.2
Escanaba, Mich	41.7	25.5	25.8	18.2	17.3	22.8	29.1	48.9	60.6	66.9	64.4	60.1	40.1
Fort Benton, Mont	40.3	35.1	13.7	11.3	22.4	18.4	44.4	59.2	63	75.1	69.1	58.0	42.5
Fort Gibson, Ind. T	56.9	49.8	40.6	39.5	41.3	52.2	53.3	70.3	78.6	83.1	86.1	71.5	60.3
Fort Sully, Dak	42.1	35.1	14.9	16.1	20.3	27.7	43.9	63.2	70.2	79.2	76.1	65.2	46.2
Galveston, Tex	71	77	77	55	58	67	66	75	81.7	82.5	84.4	79.5	72.8
Grand Haven, Mich	46.9	33.3	34	28.4	27.6	32.2	36.3	56.6	65.9	70.4	68.4	63.9	47
Indianapolis, Ind	51	37.5	37.6	35.6	36	42.2	45.6	66.2	77.4	78.5	75.9	69.6	54.4
Indianola, Tex	70.1	63	58.3	55.5	58.4	67.3	66.1	74.9	81.2	82.3	84.3	79.2	70.0
Jacksonville, Fla	71.6	59.4	56.4	55.2	58.8	66.3	70.3	75.1	80.6	79.7	81.5	77.4	69.3
Keokuk, Iowa	49.8	38.9	32	27.8	29.4	38.3	44.6	67.2	76.7	80.5	76.8	67.1	52.4
Key West, Fla	76.4	72.7	71.4	68.5	74	76.1	78	80	83	83	84.0	75	76.8
Knoxville, Tenn	53.1	44.5	42.2	38.9	43.4	50.2	54.2	67.5	76.1	77.1	73.8	69.2	57.5

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La Crosse, Wis	40	28.9	24.2	20.2	21.3	29.4	40.5	64.3	70.8	77.1	71.9	62.9	45.9
Lake City, Fla	65.2	57.3	54.7	53.9	59.5	65	67.8	74.2	78.7	78.5	82.1	75.5	67.7
Leavenworth, Kans	56.9	41.8	31.9	28.4	28.8	40	49	67.3	77.4	82.8	81.3	66.8	54.4
Lexington, Ky	53.8	40.7	39.6	36.5	39.2	44.3	46.9	63.6	77.9	77.8	75.1	70.9	55.5
Louisville, Ky	54	41.5	38.7	37.5	39.5	45.6	48.8	68.2	80.7	80.7	79.3	72.2	57.2
Long Branch, N. J	.....	.....	.....	36.5	32.8	38.7	41	56.2	68.3	71.4	69.9	67.5	.....
Lynchburgh, Va	53.6	42.5	40.4	39.9	41.1	47.5	51	66.1	77.4	77.9	72.0	69.0	56.5
Memphis, Tenn	56	49	44	45	45	53	55	72.4	81	82.8	82.9	73.2	61.6
Marquette, Mich	43	26	26.8	23.4	19.2	23.9	30.3	51.3	58.8	64.5	62.9	60.2	40.8
Milwaukee, Wis	46.4	30.9	29.6	23.3	26.3	31.2	36.9	55.8	66.1	71.5	68.1	63.6	45.8
Mobile, Ala	65.2	57.7	54.1	53.3	56.7	63.3	64.3	73.6	80.1	80.8	83.8	77.9	67.6
Montgomery, Ala	64.4	54.2	50.2	51.3	54.5	61	62.4	73.3	79.7	79.9	82.6	76.2	65.8
Morgantown, W. Va	52.2	38.2	38.7	38.5	38.9	42.1	45.7	62.9	74.2	74.1	69.5	66.9	53.5
Mount Washington, N. H	32.1	8.6	10.7	11.2	6.3	12.8	14.2	32.5	42.9	48.5	43.9	43.4	25.6
Nashville, Tenn	56.8	47.1	44.6	42.3	44.5	51.7	54.7	72	83.5	83.4	81.5	73.4	61.3
New Haven, Conn	52.7	34	32.6	32.1	28.3	30.5	39.8	56.8	67.4	72.2	67.9	64.8	48.2
New London, Conn	52.7	34.6	34.2	33.4	29.5	34.6	39.7	55.5	55.5	70.9	67.7	64.5	47.7
New Orleans, La	68.2	61.2	56.6	56	59.1	66.2	65.6	75.7	81.3	81.4	83.9	78.9	69.5
New York, N. Y	55.6	37.9	36.9	34.7	31.5	38.3	41.6	58.6	70.4	73.9	70.8	67.2	51.4
Norfolk, Va	57.6	47.2	44.5	45.2	43.1	48.9	52.2	64.1	77.7	76.9	73.2	70.4	58.4
Omaha, Nebr	48.5	38.5	25.2	22.3	23.4	33.8	45.1	66.6	73.2	80	77.3	63.0	49.7
Oswego, N. Y	50.9	32.3	33.3	28.7	25.9	32.5	36.7	53.7	62.1	69.8	67.5	65.4	46.5
Pembina, Dak	35.4	16.1	6.6	—3.	2.6	11.9	29.4	55.3	64.4	69.9	67.0	56.2	34.3
Philadelphia, Pa	54.7	38.3	38.3	36.7	33.2	40	42.5	59.9	73	74.7	71.1	68.0	52.5
Pike's Peak, Colo	.....	15.9	4.5	6.1	—.05	4.8	7.7	23.6	35	42	39.5	29.6	.....
Peck's Beach, N. J	.....	.....	.....	35.7	33.4	38.7	42.7	55.4	69.1	70.2	69.2	67.5	.....
Pittsburgh, Pa	57.3	35.8	37.1	35.5	34.4	39.3	43.3	61.9	73.9	74.7	70.4	67.6	52.6
Port Huron, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.0	.....
Portland, Me	50.5	29.2	26.3	24.9	24	32.7	36.7	52.5	61.7	67.2	64.6	60.3	44.2
Portland, Oreg	49.9	47.4	37	42.9	43.7	45.1	53.9	59.7	60.2	68.3	64.7	61.0	52.8
Punta Rassa, Fla	72.8	66.9	65.6	63.3	69.1	72.1	74.3	76.1	79.9	79.7	83.7	79.2	73.5
Rochester, N. Y	48.6	30.3	31.6	28.9	25	31.5	35.7	56.5	65.6	70.7	68.0	65.5	46.5
Salt Lake City, Utah	.....	.....	.....	.....	.....	.....	48.2	61.6	68.1	78.2	74.7	62.6	.....
Sandy Hook, N. J	.....	.....	.....	32.6	28.6	34.8	38.2	54.1	66.3	73.1	70.2	67.2	.....
San Diego, Cal	62	60.2	54.6	54.8	52.2	52	56	61	63.5	68.7	68.2	65.3	59.9
San Francisco, Cal	59.1	57.4	50.6	48.9	50.9	50.6	54.7	57.7	59.2	57.7	58.7	60.8	55.5
Savannah, Ga	63.4	55.3	51.8	52.4	53.3	62.2	66	72.2	80.7	79	79.0	75.3	65.9
Santa Fé, N. Mex	51	41.1	25.8	31	27.8	36.2	42.1	59.8	69.3	71.1	69.9	61.0	48.8
Shreveport, La	62.6	56.5	49.9	50.4	51.6	60.5	61	75.2	82.7	82.5	86.0	75.4	66.2
Saint Louis, Mo	52.3	41.8	37.2	35.5	36.6	43.1	47.6	69.5	79.2	81.5	78.3	70.2	56.1
Saint Paul, Minn	41.3	25.6	18.6	13.8	14.4	23.7	37.5	62.2	68.7	74.7	70.5	60.9	42.6
Squan Beach, N. J	.....	.....	.....	34	31	36.7	40	54.2	67.2	69.2	68.8	66.4	.....
Toledo, Ohio	50	35.7	35.8	32.4	31.1	37.5	40.8	62.1	72.1	74.7	72.0	67.5	51.0
Vicksburgh, Miss	63	57	52.4	52.2	54	62.5	57.7	75.4	81.9	81.1	84.6	76.9	66.5
Virginia City, Mont	.....	35.6	16.7	23.1	18.4	24.1	38.4	51.1	53.9	67.7	61.8	50.2	.....
Washington, D. C	55.3	41.4	40.9	40.5	36.4	44.6	47.8	64.3	77.2	78.4	73.2	70.4	55.8
Wilmington, N. C	61.4	52.5	49.2	50.1	48.1	57.3	62.8	70.1	80.1	79.1	76.7	74.1	63.4
Wood's Hole, Mass	54	38	36	34.7	30	34.9	38.2	51.3	61.8	67.8	66.2	63.8	48.0
Wytheville, Va	48.6	38.5	36.7	35.8	37.9	42.3	48.1	60.1	70	69.9	66.5	61.9	51.3
Yankton, Dak	46.1	35.9	18.1	15.6	18.8	30.6	44.4	62.1	70.7	78.2	74.2	61.7	46.4

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PAPER 9.—*Maximum, minimum, and mean temperatures.*

ALBANY, N. Y.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	37	24	8	−10	41	12	37	15	49	35	73	50	77	51	72	63	77	52
2	.....	.....	.....	.....	.....	.....	41	28	19	−16	46	31	48	29	45	34	68	45	77	63	74	57	81	57
3	.....	.....	.....	.....	.....	.....	47	35	30	7	49	30	40	29	59	33	69	52	74	60	67	48	85	55
4	.....	.....	.....	.....	.....	.....	57	45	29	17	53	26	29	15	61	36	75	49	75	53	71	49	67	46
5	.....	.....	.....	.....	.....	.....	57	25	21	5	34	20	39	19	57	39	79	59	70	59	74	51	72	51
6	.....	.....	.....	.....	.....	.....	35	25	22	− 4	35	18	39	27	60	35	85	64	79	53	76	52	75	59
7	.....	.....	.....	.....	.....	.....	55	25	15	− 5	36	23	48	31	48	29	84	64	85	62	78	56	73	54
8	.....	.....	.....	.....	.....	.....	55	20	20	− 9	40	30	48	33	59	35	75	62	87	63	75	66	78	53
9	.....	.....	.....	.....	.....	.....	44	28	22	− 6	31	11	41	33	83	41	83	58	78	62	78	64	76	50
10	.....	.....	.....	.....	.....	.....	44	25	28	15	20	10	38	29	84	47	77	58	75	62	85	59	86	52
11	.....	.....	.....	.....	.....	.....	40	32	30	15	20	10	39.5	20	63	43	61	52	75	68	83	58	85	65
12	.....	.....	.....	.....	.....	.....	35	21	34	8	21	7	30	13	66	40	70	57	69	57	85	65	75	58
13	.....	.....	.....	.....	.....	.....	31	18	49	30	16	5	42	19	75	43	61	50	83	65	76	64	72	61
14	.....	.....	.....	.....	.....	.....	34	18	48	29	28	11	60	34	75	53	72	47	85	58	68	61	77	56
15	.....	.....	.....	.....	.....	.....	30	10	42	22	32	12	64	44	74	43	80	52	92	67	75	56	76	63
16	.....	.....	.....	.....	.....	.....	18	− 3	38	28	42	21	48	32	64	50	77	52	80	56	77	54	74	58
17	.....	.....	.....	.....	.....	.....	24	4	30	13	44.5	35	38	31	68	51	76	60	77	58	80	57	64	58
18	.....	.....	.....	.....	.....	.....	32	− 1	24	8	61	44	45	22	66	48	70	59	78	56	81	59	63	58
19	.....	.....	.....	.....	.....	.....	(*)	26	38.5	11	59	40	59	34	61	44	68	58	87	63	74	54	70	57
20	.....	.....	.....	.....	.....	.....	.....	13	45	33	44	30	45	37	60	43	67	52	82	68	84	64	68	57
21	.....	.....	.....	.....	.....	.....	.....	13	42.5	36	55	28	43	30	63	50	76	56	77	64	77	59	63	45
22	.....	.....	.....	.....	(†)	.....	.....	35	38	31	43	30	49	33	59	41	84	57	76	56	70	51	63	39
23	.....	.....	.....	.....	.....	.....	.....	31	47	30	32	9	42	36	67	45	87	65	80	56	66	45	70	46
24	.....	.....	.....	.....	.....	.....	.....	24	34	21	24	6	46	35	73	53	72	57	81	63	69	54	72	45
25	.....	.....	.....	.....	36	26	24	6	26	19	52	20	45	31	64	56	75	53	80	62	71	44	76	51
26	.....	.....	.....	.....	33	23	17	− 5	30	18	56	34	38	30	63	49	68	58	80	65	72	52	78	50
27	.....	.....	.....	.....	37	30	39	12	33	16	39	22	43	30	69	47	79	57	81	67	73	47	77	51
28	.....	.....	.....	.....	36.5	24	44	23	37	10	38	28	43	29	82	51	89	58	81	63	76	48	72	55
29	.....	.....	.....	.....	35	25	35	20	.....	.....	33	20	39	29	85	59	92	66	72	62	78	55	67	52
30	.....	.....	.....	.....	28	9	38	0	.....	.....	49	26	45	25	84	61	71	58	79	56	78	54	56	44
31	.....	.....	.....	.....	35	20	13	− 1	.....	.....	34	20	.....	.....	85	63	.....	.....	78	58	77	54	.....	.....
Range	.....	.....	.....	.....	.....	.....	62°		65°		56°		51°		52°		47°		41°		41°		47°	
Monthly means	.....	.....	.....	.....	.....	.....	26°.8		22°.8		31°.5		36°.7		56°.6		66°.2		71°.1		66°.9		63°.3	

* Maximum thermometer broken.

† Station opened December 22, 1873.

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Maximum, minimum, and mean temperatures—Continued.

ALPENA, MICH.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	51	(*)	40	.....	29	.....	41	.....	15	.....	52	.....	38	.....	57	.....	62	45	72	52	72	57	69	45
2	56	.....	39	.....	41	.....	38	.....	21	.....	53	.....	34	.....	47	.....	56	38	73	57	70	51	85	53
3	46	.....	34	.....	51	.....	51	.....	22	.....	39	.....	20	.....	48	.....	56	47	67	51	69	45	67	44
4	47	.....	46	.....	46	.....	40	.....	24	.....	30	.....	27	.....	56	.....	59	47	68	57	72	47	62	36
5	52	.....	31	.....	24	.....	22	.....	23	.....	28	.....	28	.....	57	.....	72	52	73	55	64	45	70	56
6	39	.....	36	.....	30	.....	31	.....	23	.....	32	.....	40	.....	48	.....	71	51	84	65	66	56	76	51
7	62	.....	43	.....	31	.....	28	.....	22	.....	37	.....	39	.....	45	.....	(†)	47	86	61	74	54	70	51
8	56	.....	40	.....	38	.....	36	.....	27	.....	31	.....	32	.....	48	.....	.....	48	78	62	78	54	76	57
9	57	.....	33	.....	41	.....	33	.....	26	.....	24	.....	30	.....	91	.....	.....	49	73	53	70	56	80	60
10	67	.....	34	.....	32	.....	33	.....	27	.....	28	.....	43	.....	83	.....	.....	46	82	57	72	58	81	61
11	62	.....	35	.....	37	.....	27	.....	19	.....	20	.....	30	.....	54	.....	.....	44	68	53	83	61	79	64
12	46	.....	31	.....	33	.....	21	.....	35	.....	9	.....	31	.....	63	.....	.....	42	66	48	81	62	79	60
13	53	.....	25	.....	30	.....	26	.....	45	.....	23	.....	40	.....	64	40	.....	40	74	50	64	53	73	61
14	61	.....	26	.....	39	.....	20	.....	33	.....	31	.....	57	.....	48	40	.....	48	89	59	70	46	76	61
15	54	.....	38	.....	46	.....	9	.....	39	.....	32	.....	46	.....	46	41	.....	50	87	63	76	49	66	48
16	61	.....	37	.....	38	.....	18	.....	34	.....	36	.....	32	.....	56	43	.....	51	67	54	69	48	60	42
17	53	.....	37	.....	40	.....	30	.....	28	.....	45	.....	40	.....	47	39	.....	53	67	54	86	61	62	57
18	60	.....	33	.....	37	.....	34	.....	26	.....	52	.....	59	.....	56	33	.....	52	76	57	73	52	66	55
19	44	.....	22	.....	34	.....	32	.....	37	.....	41	.....	35	.....	52	33	.....	53	91	62	79	56	69	54
20	40	.....	17	.....	29	.....	26	.....	34	.....	42	.....	34	.....	54	42	.....	61	69	52	76	60	60	41
21	46	.....	30	.....	27	.....	37	.....	32	.....	39	.....	41	.....	62	38	.....	69	77	47	66	54	62	34
22	48	.....	33	.....	32	.....	36	.....	27	.....	37	.....	45	.....	62	38	.....	59	74	51	61	50	70	48
23	52	.....	30	.....	37	.....	27	.....	29	.....	18	.....	33	.....	54	45	.....	67	77	60	65	49	65	46
24	50	.....	29	.....	36	.....	15	.....	23	.....	32	.....	34	.....	55	42	.....	52	76	60	71	45	80	48
25	46	.....	25	.....	32	.....	11	.....	14	.....	39	.....	41	.....	60	44	78	57	84	66	68	48	70	51
26	42	.....	23	.....	35	.....	28	.....	28	.....	28	.....	40	.....	68	45	69	58	78	61	68	48	67	61
27	40	.....	25	.....	33	.....	33	.....	30	.....	32	.....	37	.....	69	45	72	54	71	53	69	51	68	49
28	35	.....	27	.....	28	.....	27	.....	37	.....	23	.....	38	.....	76	52	97	59	72	51	69	48	62	44
29	33	.....	23	.....	29	.....	24	.....	.....	.....	36	.....	43	.....	58	51	80	53	76	50	70	54	61	42
30	37	.....	21	.....	29	.....	7	.....	.....	.....	32	.....	46	.....	84	55	72	48	69	48	70	51	50	38
31	40	.....	.....	.....	32	.....	18	.....	.....	.....	21	.....	.....	.....	79	54	.....	.....	79	59	68	51	.....	.....
Range																			44°		41°		51°	
Monthly means	41°.8		26°.2		28°		21°.6		20°		24°.6		29°.9		49°.8		60°.2		65°.1		63°.3		60°	

* Minimum thermometer broken.

† Maximum thermometer out of order.

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Maximum, minimum, and mean temperatures—Continued.

ATLANTIC CITY, N.J.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1							43	36	29	19	43	31	36	31	67	44	78	58	77	68	76	65	75	61
2							45	41	36	25	48	31	44	33	54	44	61	50	78	68	77	66	81	58
3							48	41	36	29	51	37	51	38	54	36	61	55	80	64	74	57	79	64
4							49	43	33	24	62	37	47	25	54	42	74	58	78	65	72	59	75	65
5							50	38	33	21	43	30	46	22	50	44	70	58	73	64	74	57	72	68
6							48	37	30	17	39	34	64	43	54	40	70	62	67	60	78	59	77	65
7							49	45	31	21	50	37	48	42	53	42	73	63	74	62	78	66	86	64
8							48	35	32	14	46	32	44	37	69	45	93	65	76	64	73	67	81	62
9							45	32	36	17	37	28	44	39	83	52	79	65	76	66	79	66	72	64
10					*50	28	48	37	30	25	43	26	47	36	83	56	79	68	76	66	80	64	76	57
11					47	26	45	30	40	24	39	27	48	30	67	44	70	66	75	65	79	66	82	64
12					55	45	36	25	38	25	40	23	42	23	53	43	86	67	74	64	78	68	76	67
13					54	40	36	26	45	38	29	19	41	27	63	47	71	57	74	64	81	70	71	68
14					48	29	39	24	54	36	41	22	53	39	63	51	70	57	77	63	73	68	73	67
15					44	28	37	11	41	33	39	32	65	47	54	49	74	55	76	62	73	64	78	68
16					49	37	34	10	55	35	40	33	57	42	68	52	74	64	79	64	77	61	72	69
17					45	31	28	11	39	23	46	38	43	38	62	52	82	66	76	64	75	63	71	66
18					55	27	37	17	31	17	52	41	43	35	67	52	82	63	80	63	82	57	77	69
19					49	36	41	33	43	31	55	41	46	36	69	44	72	58	79	64	77	67	70	66
20					44	34	39	30	51	38	57	38	53	42	59	52	64	58	77	67	83	70	71	62
21					35	24	42	36	49	38	47	33	62	41	67	62	75	57	76	64	86	71	69	55
22					33	19	48	39	49	41	57	40	48	36	68	48	78	62	73	62	82	66	64	53
23					34	29	61	40	60	39	49	27	48	43	62	48	84	65	78	60	72	66	70	54
24					37	24	41	28	53	32	35	17	49	39	58	53	88	67	77	62	70	62	72	55
25					36	24	29	17	55	31	44	23	45	41	63	53	78	59	80	63	70	66	73	59
26					41	32	34	12	38	33	48	41	48	36	74	54	89	69	81	68	69	57	74	60
27					42	34	41	33	40	29	48	37	59	36	67	53	74	67	81	69	69	58	73	61
28					42	30	53	38	43	23	52	38	45	39	71	55	75	65	82	67	69	57	68	64
29					42	28	41	27	.....	.....	46	36	42	31	68	54	81	68	74	68	70	55	71	56
30					36	20	39	26	.....	.....	49	37	56	42	63	56	84	70	82	62	74	57	66	50
31					39	20	42	28	.....	.....	43	32	.....	.....	68	56	.....	.....	79	64	74	60	.....	.....
Range							51°		46°		45°		43°		47°		31°		22°		31°		36°	
Monthly means					37°.4		36°		34°.1		38°.6		42°.9		55°.4		68°.8		70°.3		69°.5		67°8	

* Station opened December 13, 1873.

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Maximum, minimum, and mean temperatures—Continued.

AUGUSTA, GA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	97	70	90	74	93	68	84	66
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	73	90	72	96	75	85	64
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	87	68	85	72	94	75	87	67
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	73	88	70	92	74	88	66
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	73	97	70	88	69	87	67
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*73	53	90	73	92	76	87	70	86	66
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	52	88	73	89	71	82	70	88	67
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	82	54	91	74	90	68	90	69	91	69
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	81	55	94	74	91	72	92	68	92	67
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	56	97	78	89	70	92	68	83	69
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	59	91	73	85	69	97	71	86	68
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	64	92	72	80	68.5	101	78	85	66
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	62	86	71	85	69	95	74	87	68
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	66	87	72	89	69	94	72	81	71
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	82	66	86	69	92	71	91	67	86	73
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	66	85	71	94	70	89	73	87	71
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	60	86	71	95	71	86	68	88	70
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	59	89	72	93	71	88	66	89	69
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	59	93	70	84	71	90	73	85	69
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	55	93	70	89	69	92	74	87	69
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	62	90	72	89	71	95	73	81	66
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	62	90	69	92	72	93	72	79	62
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	57	92	71	87	71	90	71	80	59
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	65	97	73	86	70	92	73	84	64
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	95	69	99.5	78	86	70	81	70	84	67
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	73	96	78	81	73	84	61	84	67
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	71	97	74	85.5	70	81	65	81	64
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	64	90	74	84	71	72	62	70	60
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	67	91	72	90	73	67	61	76	57
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	69	90	71	86	72	76	62	79	53
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	69	.....	.....	90	70	81	65	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31°.5		29°		40°		39°	
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72°.5		81°.4		78°.5		78°.8		74.°7	

*Station supplied with self-registering maximum and minimum thermometers May 6, 1874.

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Maximum, minimum, and mean temperatures—Continued.

BALTIMORE, MD.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	65.5	47	53.5	31	36	30	44	33	29	23.5	52	30	41	31	70	47	79	62	86	67	86	70	83	63.5
2	67	52.5	58	31.5	39	32	52	39	31	20	54	33	45	35	59	48	72	56	86	69	84	68.5	82	59
3	70	51.5	62	43	52	35	55	42	38	28.5	59	39	54	36	60	41	63	57	87	69	81.5	62	88	65
4	68.5	53	58	33	73	51	67	46	38	28	68	42	46	32.5	53	42	74	58	92	67	79	61	75	65
5	73.5	58	62	44	44	(*)	56	36	38	24	52	35	42	28	60	44	82	64	80	69	79	59	78	64
6	64	46	51	39	41	.....	54	34	32	21	46	34	64	36	64	45	82	70	81	65	82	63	81	67
7	54	41	51.5	40	38	.....	62	50	32	22	46	34	62	47	62	46	90	70	83	65	74	67	85	65
8	72	48	59	47	48	.....	53	37	36	22	48	35	55	45	73	44	96	74	92	68	76	68	90	66
9	70	51	56	42	59	41	49	33	36	15	39	29	56	41	83	55	97.5	74	92	74	87	66.5	80	66
10	65	46	46.5	38	49	36	48.5	36	36	27	49	32	51	39	89	63	89	76	95.5	75	86	69	82	59
11	67	46	46	33	53	33	45	33	43	26	44	33	64	35	76	49	79	72	86	73	86.5	65	88	66
12	64	51	47	36	70	48	40	30	41	27	45	28	44	27	65	45	87	70	84	72	88	67	89.5	70.5
13	60	43	49	28	63	40	34	27	49	37	31	23	48	29	74	53	74	61	87	71	87.5	72.5	77	68.5
14	71	44	40.5	26	44	33	40	27	50	38	42	25	60	41	77	57	77	54	92	69	79	65	76	69
15	68	49	48	28	53	32	30	14	47	34	47	31	68	55	68	57	80.5	57	94	73	86.5	65	78	68
16	73	48	64	34	50	37	24	13	57	35	44	35.5	62	46	70	55	79	63	89	74	84	61	72	68
17	73	55	44	34	51	33	29	13	45	31	55	40	47	41	72	58	83	68	84	66	82	61	73	64.5
18	69	59	43	34	57	38	35	14	37	22	54	49	48	40	67	54	90	64	86.5	66	91	60	77	64
19	71	60	42	32	53	40	45	29.5	42	26	72	49	47	42	72	47	83	62.5	88	68.5	86	71	79	67
20	53	43	39	24	45	34	47	35	51	36	55	45	55	44	69	53	73	63	91	69	97	69	73	62
21	52	42	42	22	38	26	47	32	72	45	56.5	37	60	46	67	53	80	61.5	81	69	96	75	69	55
22	63	40	42	29	36	25	65	42	74	51	56	43	60	44	71	49	86	63	84	65	82	66	70	51
23	66	43	43	28	38.5	28	69	42	78	52	48	30	52	45	71	47	95	68.5	84	64.5	71	61.5	73	52
24	65	50	53.5	39	46	29	46	29	57	34	39	23	58	44	67	60	93	76.5	82	67	70	59	75	58
25	61	46	47	36	41	30.5	29	22	40	27	56	26	51	41	83	60	89	64	84	70.5	69	63	76	58
26	59	38.5	41	31	40	32	36	18	38	25	62	41	53	37.5	75	58	91	74	85	71.5	73	56.5	79	59
27	65	51.5	52	34	42	34	47	35	43	29	57	43	61	39	73	54	82	72	76	71	72	55	79	59
28	55	38	42	30	43	34	57	39	45	22	57	42	54	38	82	62	93	72	83	71	75	53.5	72	64
29	48	31	39	29	43	30	58	33	.....	.....	52	39	46	33	84	60	97	75	78.5	67	74	52	63	59
30	48	30	39	25	41	24	43	30	.....	.....	62	36	58	34	83	63	85	73	84	64	75	54	64	53
31	48	33.5	.....	.....	43	21	43	29	.....	.....	51	33	.....	.....	84	65.5	.....	.....	87	62.5	77	63	.....	.....
Range	43°		42°		.....		56°		63°		49°		41°		48°		43°.5		33°		45°		39°	
Monthly means	44°.2		41°		40°.4		39°.1		37°.3		43°.7		46°.9		63°.1		75°.9		77°.3		72°.8		69°.9	

* Minimum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

BARNEGAT, N. J.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	46	26	25	18	46	29	33	.....	63	.....	77	.....	83	.....	87	.....	77	.....
2	.....	.....	.....	.....	.....	.....	46	38	34	23	47	33	40	.....	54	.....	60	.....	80	.....	84	.....	82	.....
3	.....	.....	.....	.....	.....	.....	54	40	36	29	50	38	50	.....	61	.....	64	.....	76	.....	79	.....	84	.....
4	.....	.....	.....	.....	.....	.....	53	42	31	25	61	36	42	.....	60	.....	67	.....	80	.....	74	.....	66	.....
5	.....	.....	.....	.....	.....	.....	49	36	34	21	46	30	43	.....	51	.....	74	.....	76	.....	73	.....	73	.....
6	.....	.....	.....	.....	.....	.....	47	35	28	13	36	32	60	.....	51	.....	73	.....	67	.....	77	.....	74	.....
7	.....	.....	.....	.....	.....	.....	51	46	28	21	51	36	42	.....	50	.....	83	.....	78	.....	80	.....	83	.....
8	.....	.....	.....	.....	.....	.....	48	35	29	11	45	32	44	.....	70	.....	92	.....	80	.....	75	.....	78	.....
9	.....	.....	.....	.....	.....	.....	45	31	35	18	37	27	42	.....	81	.....	83	.....	84	.....	69	.....	73	.....
10	.....	.....	.....	.....	*53	33	48	32	31	25	38	24	44	.....	85	.....	79	.....	85	.....	84	.....	79	.....
11	.....	.....	.....	.....	47	34	43	33	35	21	37	27	51	.....	52	.....	70	.....	81	.....	78	.....	80	.....
12	.....	.....	.....	.....	61	43	36	27	38	26	38	27	40	.....	51	.....	90	.....	76	.....	83	.....	72	.....
13	.....	.....	.....	.....	53	38	35	25	45	35	32	18	42	.....	70	.....	70	.....	84	.....	83	.....	71	.....
14	.....	.....	.....	.....	40	30	35	24	54	35	38	22	61	.....	70	.....	70	.....	82	.....	70	.....	74	.....
15	.....	.....	.....	.....	47	32	22	11	40	34	34	23	58	.....	51	.....	79	.....	84	.....	73	.....	79	.....
16	.....	.....	.....	.....	50	35	22	9	51	36	40	29	57	.....	65	.....	77	.....	85	.....	74	.....	71	.....
17	.....	.....	.....	.....	50	32	25	11	37	22	45	34	43	.....	67	.....	80	.....	70	.....	73	.....	68	.....
18	.....	.....	.....	.....	51	33	39	16	31	16	53	39	41	.....	62	.....	80	.....	78	.....	89	.....	69	.....
19	.....	.....	.....	.....	54	36	44	36	43	31	55	42	49	.....	69	.....	70	.....	81	.....	75	.....	69	.....
20	.....	.....	.....	.....	44	34	38	31	47	39	50	40	52	.....	65	.....	64	.....	77	.....	95	.....	72	.....
21	.....	.....	.....	.....	36	24	43	35	50	38	47	35	55	.....	67	.....	72	.....	78	.....	86	.....	67	.....
22	.....	.....	.....	.....	32	22	50	39	47	37	52	40	52	.....	68	.....	80	.....	71	.....	77	.....	62	.....
23	.....	.....	.....	.....	38	27	61	42	56	38	39	32	45	.....	70	.....	94	.....	80	.....	70	.....	71	.....
24	.....	.....	.....	.....	36	25	42	30	49	30	37	18	48	.....	61	.....	86	.....	77	.....	72	.....	73	.....
25	.....	.....	.....	.....	38	28	30	17	32	28	47	27	46	.....	65	.....	82	.....	83	.....	68	.....	76	.....
26	.....	.....	.....	.....	42	33	29	10	34	20	55	39	47	.....	70	.....	85	.....	82	.....	70	.....	74	.....
27	.....	.....	.....	.....	42	33	42	28	38	27	42	26	57	.....	68	.....	71	.....	83	.....	68	.....	71	.....
28	.....	.....	.....	.....	42	30	48	37	40	24	52	(†)	44	.....	70	.....	81	.....	81	.....	69	.....	65	.....
29	.....	.....	.....	.....	41	29	41	30	.....	.....	39	.....	42	.....	73	.....	87	.....	72	.....	69	.....	66	.....
30	.....	.....	.....	.....	28	21	36	24	.....	.....	51	.....	55	.....	62	.....	84	.....	78	.....	74	.....	59	.....
31	.....	.....	.....	.....	37	18	42	25	.....	.....	41	.....	.....	.....	70	.....	.....	.....	82	.....	75	.....	.....	.....
Range	.....	.....	.....	.....	.....	.....	52°		45°		43°		.....		.....		.....		.....		.....		.....	
Monthly means	.....	.....	.....	.....	36°. 9		35°. 5		32°. 8		38°. 1		41°. 4		55°. 5		69°. 3		70°. 2		69°. 1		66°. 6	

* Station opened December 10, 1873.

† Minimum thermometer broken.

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***Maximum, minimum, and mean temperatures*—Continued.**

BOSTON, MASS.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	61	40	49	37	19	6	45	23	15	2	49	26	40	16	48	34	62	50	85	60	86	66	77.5	61.5
2	65	45	55	33	27	13	47	37	16	0	59	24	40	26	45	33	66	49	81	62	82	63	81	58.5
3	69	43	57	37	56	21	44	34	30	10	60.5	36	46	30	59	32	71	49	81	62	75	55	87	62
4	67	50.5	52	33	62	50	60	43	33	18	58	36	33	20	65	49	62	52	74	60	78	53	69	51.5
5	73	56	52	32	50	30	55	32	21	9	43	21	41	11	53	35	81	52	65	54	75	56.5	68.5	52
6	72	55	45	30	43	25	37	31	20	7	40	19	50	30	57	35	77	58	68	57	76	58	77	61
7	58	45	47	27	36	21	44	29	25	9	39	31	40	30	49	39	70	56	83	56	85	60	74	60
8	60	45	50	44	39	18	55	40	29	10	41	26	46	30	57	(*)	83	64	87	65	75	64	76	59.5
9	57	32	50	37	51	33	50	33	34	14	35	22	42	35	67	.....	80	62	86	70	69	60	70	59
10	61.5	41	37	27	40	28	47	35	35	11	29	19	40	34	75	.....	78	56	80	69	89	63	90	60
11	64	40	43	26	40	25	40	31	35	19	26	12	51	30	52	.....	61	52	84	70	91	68	83.5	69
12	64	46	55	34	40	38	34	25	37	12	26	11	32	20	67	.....	63	52	73	56	88	67	69.5	57.5
13	55	42	44	27	43	27	30	18	52	23	23	10	45	20	82	.....	67	53	82	56	76	66	70	51
14	67	41	31	20	35	25	32	20	52	33	38	18	67	32	81	58	77	49.5	87	64	65	59	76	56
15	69	43	41	20	37	30	21	12	41	28	38	20	66	51	59	50	82	55	94	68	70	59	76.5	57.5
16	71	48	36	25	47	30	16	8	42	28	43	22	52	42	52	43	81	62	91	68	74	58	74	65
17	63	44	41	24	44	30	26	7	33	18	40	33	42	32	74	48	73	62	85	63	72	58	67	59.5
18	62	36	36	29	45	33	38	13	37	12	60	39	47	29	68	51	71	61	82	62	84	59	61.5	59
19	71	52	36	25	43	33	47	30	40	17	63	47	62	34	64	49	62	50	89	66	77	62	61	57.5
20	66	56	30	22	41	32	34	22	54	33	54	34	48	36	67	50	56	49	86	66	84	66	66	57
21	66	50	37	21	32	15	37	19	42	38	52	29	60	34	55	47	68	53	77	66	80	65	69	52.5
22	68	50	44	27	32	17	50	34	45	35	45	34	53	34	58	45	86	53	82.5	46	72	56.5	63.5	46.5
23	71	46	42	27	36	11	60	38	52	35	37	20	43	34	69	44	89	71	80	60	67.5	56	70	47
24	70	51	47	29	41.5	24	42	27	34	26	27	6	52	34	72	52	75	63	85.5	64	69	51	70	51.5
25	59	42	33	22	38	34	23	10	34	22	47	19	42	33	61	56	82	59	88	63	70	53	79	56
26	54	37	24	12	39	22	16	0	34	16	58	40	39.5	32	73	53	79	63	83	65	70	51	72	57.5
27	63	48	27	11	35	21	29	14	37	22.5	45	33	51	35	68	50	79	60	87	64	71	51	63	53.5
28	53	41	29	11	34	22	40	22	34	14	44	32	48	33	83	54	92	59	87.5	64	75	53	65	52
29	46	37	32	11	37	24	36	20	.....	.....	36	28	40	33	69	54	98	68	81	67	78	58	63.5	58.5
30	48	32	38	12	29	11	32	5	.....	.....	49	25	42	31	66	54	83	66	82	63	81	56	64	51
31	48	42	.....	.....	34	14	17	5	.....	.....	38	23	.....	.....	86	63	.....	.....	86	62	83	60	.....	.....
Range	41°		46°		56°		60°		54°		57°		56°		.....		49°		40°		40°		43°.5	
Monthly means	53°		33°.4		32°.9		31°.2		28°.3		35°.3		39°.1		56°.1		65°.8		72°.2		67°.7		63°.8	

* Minimum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

BRECKENRIDGE, MINN.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	56	19	42	13	28	18	33	20	21	− 8	37	7	35	20	58	47	69	40	75	55	74	49	78	62
2	48	27	22	12	27	− 2	34	15	28	4	32	15	27	10	62	40	65	50	88	59	67	54	60	47
3	46	35	52	11	2	− 6	26	− 8	17	4	20	−10	24	10	60	33	76	43	89	75	81	53	68	37
4	66	35	39	13	4	−16	− 2	−23	17	− 7	20	−11	26	0	62	30	72	54	89	60	75	62	67	48
5	36	34	37	18	5	−25	26	−12	20	− 9	31	0	41	6	68	34	68	44	79	66	79	59	75	38
6	55	15	51	15	15	−25	30	3	19	0	24	− 8	28	15	70	34	70	54	85	60	83	59	88	49
7	72	35	41	19	29	11	35	3	26	5	10	− 1	37	14	84	34	78	51	88	59	79	59	91	58
8	73	40	39	19	52	8	40	12	23	0	2	−15	31	16	93	51	64	50	85	63	87	56	91	59
9	71	43	38	28	8	−10	10	0	14	−11	20	0	45	17	96	63	64	41	80	61	89	61	78	68
10	68	37	46	25	34	−16	8	0	11	− 3	14	− 9	47	27	78	54	54	41	72	52	82	60	71	55
11	57	25	43	19	21	− 6	0	−14	28	− 7	8	−11	34	21	59	42	56	41	78	52	79	64	74	54
12	57	26	27	10	8	−14	11	−15	15	− 6	2	−25	45	25	60	40	72	38	83	64	67	56	67	40
13	66	45	29	12	15	−10	− 4	−27	4	−20	17	−24	56	25	68	33	76	48	86	57	74	60	68	37
14	61	25	48	19	21	− 8	−23	−32	6	−15	37	16	36	27	48	44	72	54	84	65	82	61	55	34
15	59	43	52	29	16	1	− 4	−24	14	−25	38	20	39	23	59	39	68	54	76	50	85	63	65	26
16	60	40	46	34	15	0	18	− 4	11	−13	37	33	52	28	60	41	89	46	87	55	81	63	66	45
17	56	33	36	14	15	− 9	40	15	29	−15	40	29	50	34	62	33	86	56	84	59	74	51	63	48
18	47	32	14	1	19	− 4	30	−14	32	23	29	24	40	15	80	36	88	70	92	62	74	50	55	43
19	58	33	23	− 7	17	−10	1	−27	28	−10	28	13	47	23	68	48	90	65	70	56	75	63	54	36
20	61	24	32	10	− 4	−29	26	0	28	−11	25	16	39	29	69	34	86	65	81	44	71	53	62	34
21	51	31	32	11	28	−15	25	−13	− 9	−21	29	5	46	25	78	44	91	68	86	50	74	58	69	39
22	31	19	24	3	23	7	−10	−21	5	−15	19	1	34	20	83	53	92	69	87	55	72	56	70	36
23	33	15	46	18	26	4	−10	−22	− 3	−20	16	−10	54	20	88	54	90	70	79	60	70	58	81	41
24	36	12	36	21	26	− 3	− 5	−33	12	−29	41	4	50	33	74	58	90	71	83	56	76	58	83	40
25	33	12	21	14	33	8	10	−25	17	−24	38	10	44	31	80	48	84	67	75	58	80	58	76	53
26	31	21	23	10	25	2	23	0	19	− 1	18	0	42	27	91	58	87	68	69	51	66	61	59	49
27	28	30	10	− 6	20	− 3	14	− 3	33	− 5	23	8	46	37	93	62	81	67	77	45	68	62	64	40
28	32	10	15	−11	24	8	8	−10	31	− 9	24	− 3	56	37	88	64	71	55	81	56	91	66	75	32
29	35	22	18	− 1	13	− 8	2	−13	.....	.....	34	16	73	40	86	61	80	48	78	50	74	59	65	32
30	34	12	27	12	16	− 9	− 2	−15	.....	.....	26	10	70	47	75	58	74	58	88	51	77	48	78	30
31	30	13	.....	.....	35	6	10	− 8	.....	.....	29	2	.....	.....	69	48	.....	.....	74	60	79	56	.....	.....
Range	61°		63°		64°		73°		62°		64°		73°		66°		52°		48°		43°		65°	
Monthly means	38°.2		23°.4		8°		2°.6		4°.2		15°.1		34°		60°.2		65°.9		70°.2		6.°.8		57°.7	

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Maximum, minimum, and mean temperatures.—Continued

BROCKVILLE, CANADA

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	45	29	6	— 8	40	27	2	—25	40	21	33	8	49	29	63	50	77	51	77	60	82	49
2	.....	.....	52	34	39	0	39	30	0	—17	47	22	42	21	46	33	69	42	80	56	71	55	83	53
3	.....	.....	46	23	45	37	49	37	18	— 2	55	37	36	22	61	32	67	44	74	58	71	46	75	44
4	.....	.....	49	22	58	33	62	43	23	7	50	16	24	7	59	30	71	55	73	56	78	44	69	39
5	.....	.....	49	20	35	26	44	17	15	—11	23	8	35	14	56	34	83	54	75	59	78	48	79	44
6	.....	.....	36	20	30	23	30	16	7	—22	24	11	40	27	46	33	70	58	81	55	79	48	74	62
7	.....	.....	47	26	36	14	35	28	10	— 5	37	20	44	28	54	25	82	53	87	64	78	54	78	53
8	.....	.....	45	38	35	19	37	32	20	—12	37	29	40	22	59	37	74	55	83	63	83	59	80	52
9	.....	.....	40	26	45	34	40	31	28	— 4	30	11	36	23	63	42	79	50	79	59	87	56	81	44
10	.....	.....	33	20	38	23	37	30	28	15	17	9	38	25	59	44	68	54	76	58	83	60	84	60
11	.....	.....	22	28	38	24	34	18	24	6	15	4	37	18	62	39	58	48	72	59	86	57	79	60
12	.....	.....	37	25	38	26	23	9	16	—12	15	1	32	12	73	42	65	50	68	56	89	65	71	54
13	.....	.....	27	16	28	13	15	4	46	11	20	4	44	18	73	53	67	46	77	60	77	45	83	52
14	.....	.....	28	11	31	1	16	8	42	25	28	14	61	33	68	47	70	48	81	57	76	50	85	62
15	.....	.....	30	23	32	21	11	1	43	18	33	10	55	37	71	39	75	51	84	66	82	46	83	62
16	.....	.....	30	22	40	29	10	— 8	41	27	42	11	55	23	78	48	72	60	76	59	81	47	66	54
17	.....	.....	26	22	41	21	20	—13	29	11	43	29	34	28	61	45	71	58	78	47	83	57	61	53
18	.....	.....	30	23	42	29	33	17	21	— 1	57	39	42	19	63	45	71	58	78	56	81	64	68	56
19	.....	.....	23	16	34	16	39	17	37	9	52	38	55	31	64	42	68	55	88	58	78	64	73	60
20	.....	.....	26	2	32	5	19	3	40	28	40	24	40	32	59	44	62	49	77	60	82	64	69	52
21	.....	.....	29	5	24	—11	36	6	30	23	48	29	44	31	60	47	77	48	80	50	67	56	63	43
22	.....	.....	26	12	29	20	49	33	28	17	37	27	49	29	62	43	77	55	79	51	68	48	67	36
23	.....	.....	27	22	29	17	51	24	40	22	34	8	41	28	63	35	82	62	82	53	70	44	70	53
24	.....	.....	24	19	31	20	33	9	35	6	27	3	43	28	70	49	71	48	87	56	74	40	73	47
25	.....	.....	23	11	31	19	11	— 9	22	15	40	19	43	24	68	52	71	50	89	65	77	47	77	47
26	49	33	15	— 1	31	19	0	—18	24	12	40	31	42	30	56	45	70	56	85	68	80	52	82	51
27	55	38	14	0	24	19	7	— 3	32	11	35	15	45	28	65	49	79	45	75	60	81	51	.....	.....
28	42	35	19	1	27	16	22	7	32	5	35	21	41	25	76	49	85	56	64	58	82	48	.....	.....
29	38	28	19	2	34	19	14	— 3	.....	.....	29	11	37	27	74	54	83	67	78	58	80	51	.....	.....
30	37	25	17	— 5	26	0	3	—18	.....	.....	40	24	47	29	82	54	72	54	84	55	83	50	.....	.....
31	51	31	.....	.....	33	24	1	—16	.....	.....	31	13	.....	.....	76	58	.....	.....	76	57	80	50	.....	.....
Range	.....	.....	57°		69°		80°		71°		56°		54°		57°		43°		42°		49°		.....	.....
Monthly means	.....	.....	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	.....

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Maximum, minimum, and mean temperatures—Continued.

BUFFALO, N. Y.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	58	47	41	29	21	12	40	35	14	2.5	38.5	29	35.5	17.5	41	33	63	52	77.5	54	74	63.5	77.5	53
2	58.5	41	52	36	49	20	44	31	27.5	2	48.5	29.5	37	25	45	34	68	45	72	62	67	56	75	54
3	60	45.5	47.5	29	60	47.5	58	44	29	22	54	39	35.5	21	56	30	68	56	71	56	66	51.5	72	56
4	63	48	51	29	60	31	65.5	29	27.5	18.5	48.5	21	22	13.5	54	41	69	59	76	58.5	69	48.5	71.5	49
5	59.5	50	49.5	30	32	21.5	31	23	24.5	14	31.5	18	37	14	56	38.5	70	62	77	58.5	75.5	49	81.5	56
6	50.5	37.5	37	27	29.5	21.5	34	23.5	21.5	12.5	39.5	25.5	38	28	49	33	76	60	76	61.5	74	56	71	63
7	52	34	53.5	28	32	18	35.5	31.5	23	13	48.5	33	40	30	42	30	76	62	82	70	79.5	64.5	77.5	61
8	59	46.5	48	39	45	27.5	38	31.5	35.5	3.5	33	22	40	30	54	39	68	58	76.5	69	80.5	65.5	75	67
9	68	41.5	40.5	21.5	50	36	42	32	26.5	13	24.5	19	35	31	59	46	73	60	85	67	75	63.5	76	57
10	72.5	48	32	26	37	33.5	37	26	29.5	15.5	31	17	35	22	54	41	73.5	60	74	66	75	67.5	76	65
11	65.5	55.5	36	28	45	33	32	24	25	17	24	18	37	22.5	65	43	67.5	53	74	63	87	62.5	75	69.5
12	56.5	40.5	40.5	27	41.5	33	25.5	19	51	11	23	10.5	30	20	80	54	60	52	64.5	58.5	82.5	70	80	65
13	55.5	39.5	28	21	35	22	26	18	49.5	31.5	20.5	9	56	24	64	49.5	59	48	68	57	73	61	84	60.5
14	60.5	51.5	30	17.5	34	18.5	24.5	13.5	33.5	23	22	17	56	43	67	51	65	54	77	65.5	75	51.5	83	70.5
15	68	39	39	25.5	37	27	12	7	44.5	23	40	18	51	33	77	46	74	50	78	71	73.5	55	77	61
16	66.5	54	45.5	34.5	41	34	10	6	42	24.5	46	31	39	27.5	66	45.5	72	62	73.5	61	76	56	63	59
17	61	47.5	36	30	46	35	28.5	11	24.5	16	51.5	32	36	29.5	54	44.5	64	56	69	56.5	78	61	69	58
18	68.5	51	33	28	37.5	34.5	40	20	28.5	14	55.5	45.5	48	31	45.5	40.5	73	57	78	57	75	64.5	75	58
19	51.5	40	30	24	38.5	31	42	28	40.5	22.5	54.5	36	54	33	50	42	68	54	82.5	66	80	53	80	62.5
20	41	34	26	21	34.5	21.5	29	14.5	41.5	34	38	30.5	61	38.5	51	45	73	55	77.5	67	78	72	68	56
21	43.5	38.5	30	19	28	19.5	47	22	41.5	31.5	40	30	39	34	59	44	78	52	72.5	56	81	61	62	48.5
22	57	43	37	26	29	18.5	62	39	34	28	39	26	45.5	34	56.5	43	73	60.5	78	58.5	70.5	57	66	46
23	62.5	45	38.5	23	34	18	48	25	42	26.5	29	15.5	47	23.5	63	45	72	65	79	57.5	72	50.5	70	51
24	48	36.5	39	29	35.5	24	33	14	29	19.5	25	15	43	28.5	73	51	72	60	83.5	61	72	49	72	61
25	50	36	31	18	36	30	15.5	11	31	19	41	23.5	44	31.5	66.5	50	75	56	82	69.5	74	50	76	56
26	56	33	21.5	15.5	38	30	34	10	27	12.5	40	24	43	31	53	41	68	57.5	79	72	73.5	50.5	80	55
27	54	39	27	19	35	31	38	34	29	22	32	21	37.5	30.5	62.5	47	74	57	74	63	77	58	71	62
28	42.5	29	29	16	29	24	41.5	21	34	25	32	24	37	29	71	55	83	64	60	57	79	50.5	64	54
29	35	29.5	27	17	31	19	34	19	.....	.....	36	19	36	29	74	60	81	65	74	58.5	79	53.5	64	54
30	41	21	23	16	29	14	21	3.5	.....	.....	34	25.5	38.5	28.5	74	57	66	53	72.5	57.5	77	58.5	55	44
31	47	29.5	.....	.....	35	21	13.5	3.5	.....	.....	29.5	19	.....	.....	69	58	.....	.....	73.5	66	79	60	.....	.....
Range	51°.5		38°		48°		62°		49°		46°.5		47°		50°		38°		31°		39°.5		40°	
Monthly means	48°.5		30°.6		31°.9		28°.1		25°.4		30°.3		34°.2		52°.4		64°.3		69°.4		67°.9		65°.5	

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Maximum, minimum, and mean temperatures—Continued.

BURLINGTON, VT.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	60	37	45	35	7	— 6	36	28	— 2	—14	40	20	35	7	40	29	62	49	82	52	73	64	74	50
2	55	43	48	35	34	— 6	38	28	11	—20.5	50	34	46	25	42	30	71	43	77	59	70	57	75	49
3	47	38	48	26	45	34	44	35	30	10	54	42	46	22	59	34	70	51	73	60	65	52	76	51
4	59	43	27	23	56	39	56	43	20	12	53	23	20	10	60	39	72	56	75	57	76	55	68	42
5	69	57	45	26	42	29	55	20	8	— 3	23	12	39	12	53	38	80	64	75	59	74	50	69	50
6	60	39	35	25	27	24	34	18	7	— 3	24	13	40	22	46	32	69	61	80	56	76	51	78	62
7	45	36	44	23	27	18	44	33	3	— 4	38	24	49	32	51	30	83	61	84	66	73	57	70	59
8	52	35	47	32	36	17	54	34	17.5	0	40	15	46	29	53	35	72	62	85	68	76	58	71	52
9	58	38	37	27	46	38	41	33.5	24	8.5	33	16	34	28	62	39	82	55	79	65	76	59	74	48
10	67	41	29	26	38	24	41	32.5	29	18	18	10	33	26	52	42	66	54	76	62	83	61	80	50
11	70	44	34	25	38	22	37	27	19	14	12	7	38	20	62	42	57	48	77	66	86	61	69	51
12	60	42	40	34	39	29	27	11.5	24	5	11	1	28	12	67	43	68	52	65	58	87	69	69	53
13	46	39	36	20	28	15	18	13.5	47	25	16	5	38	13	75	46	57	50	80	61	70	62	75	50
14	62	43	36	20	31	10	22.5	11	44	27	22	15	52	35	66	49	73	48	87	61	69	57	79	60
15	52	40	27	20	25	16	14	7	39	25	27	16	58	45	74	40	76	52	88	67	76	56	74	62
16	66	47	33	24	41	28	11	4	40	29	47	17	49	23	64	49	75	62	78	65	79	51	70	58
17	52	40	33	24	39	22	17	0	20	12	49	39	34	29	67	48	74	59	77	60	81	59	63	54
18	58	47	27	23	41	28	33	13	19	7	57	45	47	28	56	46	64	57	82	57	79	63	61	54
19	55	39	28	23	27	18	41	28	35	12	56	41	53	36	59	46	61	54	88	64	74	51	72	54
20	45	42	28	21	34	14	28	6	42	34	34	25	43	35	61	46	66	51	78	62	78	63	70	56
21	63	53	26	16	24	4	36	8.5	38	23	48	21	42	35	55	48	74	54	75	55	72	59	60	45
22	59	42	28	21	29.5	16	48	36	38	21.5	40	28	45	32	55	45	82	58	76	54	66	52	64	39
23	65	45	28	23	24.5	14	49	27	50	24.5	30	7	45	32	67	40	83	68	82	55	67	43	68	52
24	59	41	35	20	28	10	32	18	36	12	20	2	43	34	68	49	70	49	84	67	67	46	71	47
25	48	36	21	16	33	15	18	— 5	26	16	43	18	48	28	66	53	68	53	84	66	71	45	74	53
26	50	34	12	5.5	33	19	1	—14.5	30.5	17	47	34	35	30	59	52	70	51	84	67	73	52	75	56
27	56	43	16.5	8	28	18	33	2	27	16	37	17	44	33	72	50	84	47	76	60	74	50	77	52
28	52	37	17	9	29	17	19	10	30	11	36	23	41	30	86	55	89	61	65	59	77	51	72	55
29	46	32	24	7	30	26	18	4	.....	.....	31	15	38	28	73	54	87	73	70	61	77	57	64	52
30	37	27	14	1	19	7	— 5	—10	.....	.....	39	25	40	28	81	56	75	62	80	57	79	62	53	44
31	45	35	.....	.....	36	17.5	1	—12	.....	.....	21	13	.....	.....	86	62	.....	.....	76	60	79	52	.....	.....
Range	43°		47°		52°		70°.5		67°.5		56°		51°		56°		56°		36°		44°		41°	
Monthly means	48°.7		26°.8		25°.9		23°.1		19°.6		28°.6		34°.3		5.°.6		64°.7		70°.4		66°.1		61°.9	

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Maximum, minimum, and mean temperatures—Continued.

CAIRO, ILL.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	71	48	53	24	68	53	49	39	39	33	50	40	42	33	75	59	85	70	90	68	84	68	86	65
2	69	50	52	40	63	60	62	43	35	31	59	39	57	33	72	62	86	68	94	72	85	68	90	66
3	72	56	56	42	67	39	64	57	43	27	65	47	61	34	80	57	89	70	92	72	88	66	90	69
4	78	61	61	35	39	22	50	24	45	29	60	38	57	38	58	53	91	71	96	73	89	66	87	68
5	73	56	65	41	33	25	30	16	41	27	54	38	64	42	61	55	91	73	94	70	71	66	82	68
6	80	41	66	42	35	30	39	29	44	37	59	47	52	35	75	48	93	74	95	72	89	67	85	69
7	55	37	70	43	46	34	43	24	42	31	60	38	53	44	76	56	95	74	99	76	94	76	87	71
8	68	42	67	43	64	43	54	28	46	28	49	34	52	47	79	58	91	74	94	69	92	75	86	68
9	71	48	69	43	59	29	52	41	43	32	60	30	50	33	81	56	91	74	87	72	82	69	89	72
10	77	53	66	43	50	36	58	41	53	25	58	44	53	33	81	65	85	74	84	67	101	75	87	70
11	79	57	68	42	67	47	46	30	63	38	48	32	70	42	82	64	86	68	86	69	101	76	90	68
12	73	47	50	32	68	43	35	26	64	52	47	33	73	49	85	61	75	61	90	69	101	75	89	69
13	64	43	43	25	43	28	35	32	61	33	43	24	73	51	85	63	81	58	92	67	101	78	92	66
14	69	50	51	29	46	30	25	15	49	30	50	32	75	57	84	64	88	62	91	73	90	77	88	69
15	76	49	72	40	49	31	19	6	61	38	49	40	59	49	80	61	80	69	81	70	83	70	76	63
16	80	63	65	46	56	32	25	12	52	38	57	43	59	42	70	59	83	68	85	73	89	65	69	61
17	82	63	49	40	63	43	46	19	45	29	72	51	47	38	79	54	88	65	89	70	93	69	78	65
18	77	53	45	28	60	39	52	42	36	28	(*)	57	60	40	72	55	89	66	89	73	96	71	87	64
19	58	42	30	19	47	39	56	39	58	35	.....	45	67	53	71	55	91	68	93	73	93	70	76	61
20	54	37	43	18	36	25	62	36	51	47	.....	45	61	46	82	59	93	72	94	75	90	74	74	53
21	55	33	53	35	39	21	66	58	51	44	.....	45	61	43	72	55	94	69	92	76	84	73	75	51
22	66	49	51	35	29	26	65	48	45	40	.....	42	64	49	78	59	95	68	90	74	91	71	76	55
23	67	54	54	35	44	33	51	28	42	24	.....	37	55	42	89	64	91	67	92	76	81	72	82	55
24	50	30	51	36	45	30	37	28	41	23	.....	28	51	40	92	71	91	73	96	77	86	68	72	66
25	57	37	41	32	40	30	42	22	36	27	.....	34	62	42	85	72	91	72	95	76	84	67	81	68
26	60	47	59	29	39	34	50	30	48	25	71	46	65	42	90	67	93	76	95	76	88	71	76	65
27	53	34	53	33	34	24	53	40	46	34	47	34	78	54	89	70	94	77	86	75	77	71	75	60
28	40	28	37	27	38	21	48	34	44	37	50	29	68	40	83	72	94	77	82	65	77	72	66	50
29	46	24	47	22	39	26	56	33	.....	.....	54	38	58	38	80	69	85	72	85	64	87	72	76	51
30	56	39	54	36	39	19	59	37	.....	.....	61	44	69	47	85	71	90	73	89	66	79	68	75	57
31	45	27	.....	.....	42	26	38	31	.....	.....	54	44	.....	.....	90	70	.....	.....	89	68	81	67	.....	.....
Range	58°		54°		49°		60°		41°		48°		45°		44°		37°		35°		36°		41°	
Monthly means	53°.8		45°		40°.9		39°.3		40°.1		48°.4		52°		70°.2		79°.7		81°.3		78°.6		71°.9	

* Maximum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

CAPE HATTERAS, N. C.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.	Min.	Max.	Min.	Max.	Min.
1																							(*)	64
2																								66
3																								62
4																								65
5																								69
6																								69
7																								67
8																								72
9																								68
10																								70
11																								72
12																								69
13																								72
14																								72
15																								75
16																								72
17																								74
18																								72
19																								71
20																								71
21																								65
22																								64
23																								65
24																								67
25																								69
26																								67
27																								67
28																								70
29																								65
30																								61
31																								
Range																								
Monthly mean																								72°.5

* Station opened September 1, 1874. No maximum on station.

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Maximum, minimum, and mean temperatures—Continued.

CAPE HENRY, VA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	56	.....	42	34	46	39	44	39	78	41	84	65	79	74	92	69	80	61
2	.....	.....	.....	.....	.....	.....	60	.....	44	35	53	42	43	39	64	52	69	58	83.5	71	87	71	85	65
3	.....	.....	.....	.....	.....	.....	65	.....	38	34	60	44	58	35	53	44	69	57	83	72	75	69.5	87	65
4	.....	.....	.....	.....	.....	.....	65	.....	43	31	71	47	67	39	55.5	45	76	66	84	68	74	67	83	67
5	.....	.....	.....	.....	.....	.....	62	.....	43	31	48	39	51	36	55	47	87	66	88.5	71	78	67	76	66.5
6	.....	.....	.....	.....	.....	.....	55.5	.....	47.5	34	48	40	75	50	62	44	81	70	71	66	83	65	87	71
7	.....	.....	.....	.....	.....	.....	62	.....	48	31	70	46	76	48	61	43	94	71	73	65	78	68.5	85	68
8	.....	.....	.....	.....	.....	.....	52	.....	37	31	55.5	41	51	41	76	45	94	76	89	68	82	66	89	65.5
9	.....	.....	.....	.....	.....	.....	55	.....	37	32	47	40	56	44	85	58	98	78	91.5	73	84	67	74	66.5
10	.....	.....	.....	.....	.....	.....	55	44	39	31	55	38	60	44	82	58	97	72	93	75	90	69	73	67
11	.....	.....	.....	.....	.....	.....	57	41	50	35	52	38.5	60	41	83	50	81	71	89.5	75	85	69	83	63
12	.....	.....	.....	.....	.....	.....	44	36	48	38	49	35	50	32	84	50	90	74	84	71	80	70	89	64
13	.....	.....	.....	.....	.....	.....	43	37	65	40	38	30	47	37	69	50.5	81	68	87	71	84	73	84	68
14	.....	.....	.....	.....	.....	.....	42.5	34	64	41	45	30.5	68	41	69	57	70	62	87	72	82	71	76	72
15	.....	.....	.....	.....	*55	(†)	34	24	45.5	40	49	35	79	61	63	54	72	63	90	74	81	70	79	72
16	.....	.....	.....	.....	60	.....	28	16	64	37	47	39	62	45	78	62	78	65	93.5	72	75	69	76	70
17	.....	.....	.....	.....	56.5	.....	35	23	44	36	53	45	53	41	72	58	86	70	78	70	78	70.5	76	70
18	.....	.....	.....	.....	56	.....	52	33	37	32	62	48	52	41	75	58	89	67	79	67	84	68	80	71
19	.....	.....	.....	.....	61.5	.....	53	39	53	36.5	79	60	58	42	68	53	83	69	81	67	90	68	78.5	69
20	.....	.....	.....	.....	52	.....	51.5	40	62	40	71	42	76	54	71	51	79	64.5	82	67	93	73	80	68
21	.....	.....	.....	.....	46	.....	54	40	77	44	47	43	74	53	72	55	72	62	92	72	95	75	72	65
22	.....	.....	.....	.....	40	.....	74	48	77	56	65	44	52	46	69	54	85	62	77	68	92	74.5	70	64.5
23	.....	.....	.....	.....	45	.....	76	46	79.5	58	60	39	64	44	72	56	93	68	76	69	77	73	71	64
24	.....	.....	.....	.....	42	.....	48	38	62	36	39	31	53	46	70	59	95.5	74	77	68	75	68	72	65
25	.....	.....	.....	.....	42	.....	38	29	41	35	56	30	70	45	89	61	85	70	79.5	67	73	67	74	64
26	.....	.....	.....	.....	43	.....	36.5	25	40	33	56	49	60	44	80	60	93.5	74	82	70	71	65	81	58
27	.....	.....	.....	.....	45.5	.....	53	32	51	32	64	47	62	47	71	58	91	73	81	70	70	64	82	61
28	.....	.....	.....	.....	45	.....	62	43	43	37	63	45	77	50	74	54	87.5	72	81	69	70	64	74	64
29	.....	.....	.....	.....	52.5	.....	50	38	.....	.....	52	43	65	40	76	65	93	75	85	69	73	64	72	61
30	.....	.....	.....	.....	43	.....	55	40	.....	.....	58	42	62	43	70	61	90	74	80.5	69.5	72	60	74	54
31	.....	.....	.....	.....	44.5	.....	62	42	.....	.....	52	42.5	.....	.....	73	60	.....	.....	81	64	69	61	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	48°.5		49°		47°		48°		41°		29°.5		35°		35°	
Monthly means	.....	.....	.....	.....	42°.7		44°.9		42°.9		46°.7		51°.7		65°.5		76°.2		76°.5		73°.8		72°	

*Station opened December 15, 1873.

†Minimum thermometer not in position.

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Maximum, minimum, and mean temperatures—Continued.

CAPE MAY, N. J.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	22	.....	36	.....	33	.....	47	.....	60	.....	66	.....	65	78	61
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	25	.....	40	.....	35	.....	46	.....	52	.....	66	.....	67	76	59
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	32	.....	42	.....	40	.....	38	.....	52	.....	65	.....	60	79	67
4	.....	.....	.....	.....	.....	.....	.....	*45	.....	30	.....	41	.....	39	.....	42	.....	57	.....	63	.....	57	71	65
5	.....	.....	.....	.....	.....	.....	.....	39	.....	26	.....	32	.....	25	.....	44	.....	58	.....	63	.....	58	74	67
6	.....	.....	.....	.....	.....	.....	.....	38	.....	20	.....	37	.....	46	.....	45	.....	62	.....	60	.....	62	77	67
7	.....	.....	.....	.....	.....	.....	.....	49	.....	25	.....	40	.....	43	.....	45	.....	61	.....	59	.....	65	81	66
8	.....	.....	.....	.....	.....	.....	.....	39	.....	23	.....	35	.....	39	.....	46	.....	66	.....	64	.....	66	83	69
9	.....	.....	.....	.....	.....	.....	.....	36	.....	18	.....	31	.....	40	.....	53	.....	69	.....	67	.....	65	76	63
10	.....	.....	.....	.....	.....	.....	.....	39	.....	24	.....	30	.....	40	.....	56	.....	67	.....	68	.....	66	76	57
11	.....	.....	.....	.....	.....	.....	.....	36	.....	27	.....	31	.....	37	.....	45	.....	66	.....	66	.....	65	83	66
12	.....	.....	.....	.....	.....	.....	.....	31	.....	31	.....	28	.....	26	.....	44	.....	65	.....	65	.....	67	84	68
13	.....	.....	.....	.....	.....	.....	.....	25	.....	40	.....	23	.....	25	.....	50	.....	61	.....	64	.....	68	72	68
14	.....	.....	.....	.....	.....	.....	.....	30	.....	39	.....	23	.....	39	.....	53	.....	58	.....	63	.....	67	74	68
15	.....	.....	.....	.....	.....	.....	.....	15	.....	36	.....	31	.....	46	.....	52	.....	60	.....	62	.....	63	76	68
16	.....	.....	.....	.....	.....	.....	.....	13	.....	37	.....	37	.....	44	.....	51	.....	62	.....	64	.....	63	74	68
17	.....	.....	.....	.....	.....	.....	.....	18	.....	29	.....	41	.....	37	.....	53	.....	65	.....	64	.....	60	75	65
18	.....	.....	.....	.....	.....	.....	.....	20	.....	18	.....	43	.....	37	.....	52	.....	65	.....	63	.....	59	74	66
19	.....	.....	.....	.....	.....	.....	.....	34	.....	32	.....	43	.....	41	.....	49	.....	63	.....	64	.....	67	71	67
20	.....	.....	.....	.....	.....	.....	.....	34	.....	39	.....	40	.....	44	.....	52	.....	58	.....	64	.....	70	73	63
21	.....	.....	.....	.....	.....	.....	.....	37	.....	40	.....	37	.....	46	.....	54	.....	55	.....	64	.....	71	67	57
22	.....	.....	.....	.....	.....	.....	.....	42	.....	44	.....	43	.....	43	.....	51	.....	62	.....	64	.....	66	65	51
23	.....	.....	.....	.....	.....	.....	.....	41	.....	44	.....	32	.....	43	.....	54	.....	63	.....	64	.....	66	69	53
24	.....	.....	.....	.....	.....	.....	.....	31	.....	35	.....	20	.....	42	.....	54	.....	68	.....	61	.....	60	70	57
25	.....	.....	.....	.....	.....	.....	.....	21	.....	31	.....	34	.....	40	.....	52	.....	60	.....	63	.....	62	71	61
26	.....	.....	.....	.....	.....	.....	.....	16	.....	25	.....	43	.....	39	.....	57	.....	69	.....	68	†70	53	76	63
27	.....	.....	.....	.....	.....	.....	.....	34	.....	32	.....	41	.....	40	.....	52	.....	66	.....	67	70	52	74	63
28	.....	.....	.....	.....	.....	.....	.....	37	.....	28	.....	41	.....	43	.....	55	.....	65	.....	67	70	54	71	64
29	.....	.....	.....	.....	.....	.....	.....	32	.....	.....	.....	35	.....	36	.....	56	.....	67	.....	66	71	52	73	59
30	.....	.....	.....	.....	.....	.....	.....	32	.....	.....	.....	40	.....	35	.....	56	.....	68	.....	65	71	58	65	55
31	.....	.....	.....	.....	.....	.....	.....	32	.....	.....	.....	40	.....	.....	.....	55	.....	.....	.....	63	73	59	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33°	
Monthly means	56°.1		42°.2		40°.6		38°.1		35°.7		40°.7		44°.4		56°		68°.5		69°.2		68°.8		68°.6	

*Station supplied with minimum thermometer January 4, 1874.

†Station supplied with maximum thermometer August 26, 1874.

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Maximum, minimum, and mean temperatures—Continued.

CAPE ROSIERE, CANADA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	45.9	31.4	.....	.....	15	6.3	20	4.3	— 4	—13.5	12.5	— 8	19	8	33	30	46	34	47	43.1	58	54.9	59	49.9
2	47	33.1	.....	.....	13.5	5.3	27.5	18.5	— 6.5	—14.7	13.5	8	28	17.5	34	29	46.5	39.1	52	44.1	60	54.9	53	49.9
3	41.6	30.3	.....	.....	47.5	23	28	18	0	—10.5	35	13	28	24	45.5	30	49	40.1	48	43.6	55	51.9	58	45.1
4	43	29	.....	.....	45.5	31.5	44.5	30	7	0	41.5	29.7	28	5.5	42.5	30	55.5	44.1	52.5	43.1	58	51.9	56	44.1
5	50	38.9	.....	.....	34	18.5	37	11	8	2	30	15	28	2	33.5	27.2	53	50.9	49	43.6	56.5	46.9	63	50.9
6	62	46.6	.....	.....	18.5	8	16.5	6.3	3	0	16.5	9.3	27	20	33	24.7	63.5	46.5	53	45.1	55.5	46.1	65	45.9
7	51.3	40.1	.....	.....	16.5	6.3	34.5	24	4.5	— 2.5	21.5	15.5	31	24	32.5	22.7	51	46	63.5	51.9	62	51.9	58	53.9
8	51.3	36	.....	.....	27.5	11.5	30.5	22.3	21.5	2.3	34	16.7	31	23.5	36	21.7	46	41	63	52.4	60	57.4	57	45.1
9	(*)	.....	38	33	31.5	21.7	32.5	16	23	19	34	32	30.8	16	36	30.7	43	39.1	71	55.9	63	54.9	56	46.1
10	.....	.....	35	26.7	26.5	9	33.5	24	21.5	15	32	30.5	23.5	14	38.5	31.7	47	37.1	63	54.4	62.5	56.9	57	47.9
11	.....	.....	29	22.6	28	10.5	34.5	26.7	21	16	31.5	28	26	19	47	26.7	50	41.1	60	52.9	70	56.9	55	46.9
12	.....	.....	32	20.7	27.5	11	30.5	17.5	18	14	29	24.3	27	17	47	36	44.5	35	62.5	49.9	75	54.9	54	46.9
13	.....	.....	44	27.2	25	11	13.5	3.5	28.5	4.8	37.5	25.3	24	16.5	45.5	33	41	38	57.5	49.4	62	48.9	55	41.1
14	.....	.....	28	17.3	15	6.5	13	— 1.8	38	25.7	38	30	36	23	49	39.1	50	37	65	52.9	66	48.9	56	46.9
15	.....	.....	29.5	18.5	12.5	1.3	22	9	26	16	32	26.5	42	30	44	35	55.5	44	72	61.9	62	47.9	59	46.4
16	.....	.....	24.5	16	21	0.3	12.9	4.3	25	21	30	24	33	23.7	45	34	56.5	46	71	56.9	62	50.9	59	51.9
17	.....	.....	25	15	31	19	16	5.8	25.5	15	37	27	33	23	47	36	46	44	60	51.9	68	51.9	52	39
18	.....	.....	39	17	34.5	26.9	25	6.3	21	13	31	28	31.5	24.7	47	33	45	42	62	49.9	65	53.9	50.1	40.1
19	.....	.....	34	22.7	26	16.5	30.5	23.7	27.5	16	38.5	30.5	42.5	26.7	42	34	43	40	72	59.9	63	53.9	55	46.9
20	.....	.....	27	20.7	27	15.5	30	2.8	32	27	39	13.5	30	23.2	45.5	36	53.3	39.9	71	55.9	65	56.9	.....	.....
21	.....	.....	27.5	19.7	16.5	3.3	15	— 3.2	28	17	22	11	30.5	26.7	46	36	55	42	58	50.9	64	46.1	.....	.....
22	.....	.....	27	14	15	1	31.5	16	18.5	11	18.5	13.5	29.5	24.7	45	39.1	56	40	62	49.9	55	45.1	.....	.....
23	.....	.....	27	14.5	16.5	3.3	38	29.2	17	10	18	13	32.5	22.7	46	36	61	52.9	67	53.9	59	47.9	.....	.....
24	.....	.....	33	13	29.5	17	11	1.3	14	7	14.5	4.3	37	25.7	45.5	35	57	46	71	57.9	59	45.1	.....	.....
25	.....	.....	30	19	15.5	4	9	— 3.2	10.5	5.7	24.5	3.3	34	29	44.5	37	46	41	76	55.4	61	45.1	.....	.....
26	.....	.....	35	26.7	13.9	1.3	0	—14.7	11	6.3	25	16	31.5	28.7	44	39.1	55	43	71	65.9	59	47.9	.....	.....
27	.....	.....	31	23.7	14.5	4.3	— 1	—13	17	3.7	25.5	12.5	36.5	27.7	45.5	36.1	59	45	68.5	55.4	59	47.9	.....	.....
28	.....	.....	27.5	20.7	23.5	9	14	— 2.2	4.5	— 6.7	19.5	12	36	29.7	52	41.1	59	46.6	59	54.9	64	52.9	.....	.....
29	.....	.....	26	13.5	23	12.5	12	2.5	.....	.....	19	8	35.5	31	45	39.1	61	47.1	59.5	53.9	65	54.9	.....	.....
30	.....	.....	15.5	5.3	21	4.3	3	— 5	.....	.....	13.5	8.5	37.5	31	43.5	35	49	44	58	53.4	59	55	.....	.....
31	.....	.....	.....	.....	11.5	2.3	— 3	— 5.5	.....	.....	13	10.3	.....	.....	37.5	34	.....	.....	59.5	53.9	67	51.9	.....	.....
Range	.....	.....	.....	.....	47°.2		59°.2		52°.7		49°.5		40°.5		30°.3		29°.5		32°.9		29.9		.....	.....
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Observer absent from October 9 until November 9, 1873.

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***Maximum, minimum, and mean temperatures*—Continued.**

CHARLESTON, S. C.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	56	37	60	41	54	51	77	65	75	57	91	74	85	77	88	74	77	70
2	.....	.....	.....	.....	.....	.....	62	47	52	45	63	40	68	52	78	61	86	72	89	75	91	78	80	69
3	.....	.....	.....	.....	.....	.....	62	54	50	40	66	50	65	47	79	64	88	70	84	70	83	73	81	71
4	.....	.....	.....	.....	.....	.....	63	54	52	40	75	53	72	52	67	60	84	76	86	74	83	73	81	69
5	.....	.....	.....	.....	.....	.....	63	58	52	35	63	50	65	58	66	55	84	74	92	74	90	68	81	71
6	.....	.....	.....	.....	.....	.....	66	57	60	44	70	50	75	62	71	51	85	76	82	73	81	73	81	70
7	.....	.....	.....	.....	.....	.....	64	40	57	46	74	62	76	65	73	55	86	77	82	71	85	73	83	71
8	.....	.....	.....	.....	.....	.....	49	36	48	36	63	47	77	65	78	62	90	78	85	73	83	73	85	71
9	.....	.....	.....	.....	.....	.....	54	36	50	35	64	43	74	69	77	65	91	77	86	77	84	71	85	71
10	.....	.....	.....	.....	.....	.....	60	47	54	35	69	49	69	55	75	62	91	77	87	74	89	72	77	66
11	.....	.....	.....	.....	.....	.....	64	45	58	35	60	47	62	45	75	64	87	77	84	74	91	71	77	69
12	.....	.....	.....	.....	.....	.....	54	46	58	43	56	41	63	50	70	64	90	77	86	70	90	78	79	70
13	.....	.....	.....	.....	.....	.....	54	43	68	51	54	44	60	50	75	65	70	72	85	69	87	73	80	71
14	.....	.....	.....	.....	.....	.....	55	43	63	52	53	37	73	59	72	64	79	71	85	75	84	73	78	68
15	.....	.....	.....	.....	.....	.....	45	34	56	44	55	46	76	64	79	65	80	69	87	76	85	71	84	75
16	.....	.....	.....	.....	.....	.....	38	27	65	45	65	51	79	66	85	65	85	74	90	75	90	59	85	75
17	.....	.....	.....	.....	.....	.....	41	28	57	42	71	60	76	68	85	65	88	77	91	77	75	52	87	73
18	.....	.....	.....	.....	.....	.....	61	38	47	38	74	60	68	58	84	67	87	74	86	79	88	50	84	75
19	.....	.....	.....	.....	.....	.....	60	43	56	37	77	63	77	61	73	64	91	70	80	73	89	58	83	78
20	.....	.....	.....	.....	.....	.....	65	48	68	43	76	60	77	68	82	66	87	76	82	71	82	58	84	75
21	.....	.....	.....	.....	.....	.....	60	49	72	54	78	61	82	66	86	69	83	74	86	77	81	57	77	70
22	.....	.....	.....	.....	.....	.....	68	54	70	57	80	62	77	65	74	65	85	75	90	73	88	48	77	66
23	.....	.....	.....	.....	.....	.....	69	59	76	60	69	59	79	66	77	65	89	75	81	73	92	74	79	66.5
24	.....	.....	.....	.....	.....	.....	64	48	64	41	61	48	81	67	86	68	92	74	81	71	89	74	80	68.5
25	.....	.....	.....	.....	.....	.....	51	36	46	40	61	48	78	59	87	73	95	77	82	72	80	71	80	71
26	.....	.....	.....	.....	.....	.....	46	33	49	38	65	58	78	54	92	74	96	80	84	72	81	68	79	71
27	.....	.....	.....	.....	.....	.....	60	38	65	44	68	55	71	55	88	72	90	74	80	72	77	65	79	72
28	.....	.....	.....	.....	*55	31	66	50	64	44	81	60	76	63	80	70	89	73	81	73	74	66	76	63
29	.....	.....	.....	.....	51	33	53	40	.....	.....	74	62	63	49	88	70	86	77	81	71	73	63	75	57
30	.....	.....	.....	.....	50	33	56	37	.....	.....	74	61	67	46	93	72	89	78	79	71	78	69	76	58
31	.....	.....	.....	.....	45	23	64	45	.....	.....	79	62	.....	.....	83	69	.....	.....	82	74	79	71	.....	.....
Range	.....	.....	.....	.....	.....	.....	42°		41°		44°		37°		42°		27°		23°		44°		30°	
Monthly means	.....	.....	.....	.....	51°.4		52°.1		51°.5		59°.9		67°.7		71°.4		81°		79°.3		79°.1		75°.8	

*Station supplied with self-registering maximum and minimum thermometers December 28, 1873.

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Maximum, minimum, and mean temperatures—Continued.

CHARLOTTETOWN, PRINCE EDWARD'S ISLAND.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																					77.5	49.6	76.8	59.9
2																					79.4	56.6	65.9	50.5
3																					74	54	63.7	55.1
4																					71.5	41.5	70.9	50.3
5																			58.3	48.4	75	48	69.7	52.2
6																			59.7	50.1	65	51.2	75.1	53.3
7																			64	52.8	79.5	54	70.1	54.3
8																			73.2	53.2	75	57	64.5	54.2
9																			76.4	56.1	75	58	57.0	47.3
10																			75.7	57	73	61	70.3	52.6
11																			80.6	62.2	78	62	67.7	48.7
12																			78	58	80	61	55.2	48.9
13																			71	55	84	55	52.6	43.5
14																			75	55	66	54	62.6	48.2
15																			78	61	64	55	70.2	48.2
16																			88	65	*61.1	51.5	71.3	56.6
17																			78	55	68.6	52	68	55.2
18																			74	61	79.9	59.1	58.4	50
19																			80	59.1	84	56.3	56.8	50
20																			81.9	61.3	76.4	59	60.3	52.1
21																			73.9	51.2	65	57.1	74.3	59.3
22																			70.9	51.2	74.2	50.2	72.7	49.2
23																			70.9	53.9	69.3	48.7	59.9	42.1
24																			75.3	58.3	72.3	52.7	70.3	45.1
25																			80	60.6	67.3	46.7	71.5	49.4
26																			84	60.5	67	59	74	48
27																			81.6	57.1	67.3	50	.....	.....
28																			83.7	61.3	67.8	48.6	.....	.....
29																			78.5	62.5	73	54.5	.....	.....
30																			82	59	80.2	*60.5	.....	.....
31																			77.5	49.8	77	58.7	.....	.....
Range																					42°.5			
Monthly means																								

* Observations taken at 8 a. m. from August 16, 1874.

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Maximum, minimum, and mean temperatures—Continued.

CHATHAM, NEW BRUNSWICK.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	53.3	29.7	47.8	32.9	9.2	— 5.5	31.4	2.5	1	—12	23.2	—22	29.4	2.6	37.3	29.7	45.3	38.9	56.3	45.1	66.3	58.7	63.3	52.1
2	54.3	33.6	48.3	31.7	13.4	—16.3	33.9	25.2	7	—23	35.3	11.5	39.3	4.6	37.3	30.7	61.3	34.9	60.3	46.1	78.3	58.2	64.3	51.1
3	45.8	28.1	49.3	30.1	40.9	5.6	39.3	21.7	14	—26	51.3	9.6	38.3	16.7	54.3	31.7	77.3	39.9	58.3	51.1	69.3	51.9	71.3	48.1
4	50.3	21.7	38.3	18.7	54.3	38.9	48.1	33.1	25	10	52.3	38.1	31.4	10	56.3	31.7	63.3	55.1	65.3	50.1	71.3	48.1	68.3	42.1
5	60.3	44.1	42.8	15.1	46.3	20.2	51.3	15.3	12	— 5	46.3	17.3	34.4	7.6	53.3	29.7	74.3	55.1	58.8	48.6	68.3	50.6	77.3	45.9
6	67.3	50.6	30.4	12.6	24.4	9.1	18.3	5.8	0	—12	27.3	10.6	32.4	20.7	51.3	23.7	74.3	48.6	77.3	46.1	61.3	49.1	73.3	47.1
7	53.3	43.6	36.3	21.7	22.4	3.6	32.7	18.3	10	—15	36.3	9.6	44.3	12.6	55.3	24.7	64.3	48.1	76.3	57.7	79.3	50.1	69.1	58.8
8	58.3	39.1	39.3	20.7	25.4	5.6	48.1	28.7	20.4	— 9.5	33.6	21.7	45.3	24.7	51.3	28.7	59.3	43.4	81.3	53.6	66.3	57.7	61.3	51.2
9	55.3	33.6	41.3	32.1	39.7	16.2	48.1	28.2	33.4	10.5	33.6	27.7	34.4	23.7	56.3	27.7	49.3	40.5	75.3	56.1	71.3	57.7	73.3	44.1
10	64.3	30.7	33.4	25.1	34.4	7.6	35.1	25.7	32.4	4.6	39.3	20.7	27.4	21.2	51.3	29.7	54.3	36.9	84.3	53.1	66.5	62.8	72.3	51.1
11	71.7	33.4	28.4	19.4	22.4	5.6	37.3	26.3	24.4	16.8	48.3	13.6	37.3	12.6	61.3	28.7	64.3	40.9	83.3	62.2	86.3	55.6	61.3	43.1
12	55.3	38.9	35.1	13.6	35.3	14.6	32.4	15.3	23.4	1	34.4	17.8	29.4	16.3	69.3	32.7	58.3	34.9	70.3	53.6	84.3	62.7	59.3	41.8
13	53.3	33.1	45.3	30.3	21.4	1.6	18.9	6.3	42.6	— 6	32.1	13.6	40.3	12.6	77.3	41.1	59.3	45.1	74.3	49.1	68.6	54.7	70.3	35.5
14	45.8	31.7	31.4	20.2	16.4	8.8	16.3	1.0	49.3	26.2	38.3	25.2	56.3	26.7	62.3	43.1	70.3	39.9	84.3	65	67.3	51.6	74.3	43.6
15	51.3	31.7	23.9	16.7	9.4	— 3.6	20.4	0	36.3	15.7	47.3	21.7	63.3	30.7	63.3	31.7	74.3	47.6	85.3	59.2	73.3	54.1	74.3	54.1
16	56.3	27.7	25.9	19.7	22.7	— 5.5	10.4	— 3.1	27.4	21.7	53.3	19.7	46.3	31.6	65.3	32.7	74.3	41.1	84.5	64.7	74.3	48.6	69.3	55.1
17	49.3	28.1	30.4	19.7	37.3	15.8	20.4	— 6.5	31.4	15	57.3	24.7	43.3	24.7	56.3	40.2	58.3	51.1	76.3	58.6	79.3	47.3	38.8	47.1
18	53.3	22.7	46.8	22.7	30.4	15.8	30.4	— 4.5	28.4	9.4	41.7	26.7	49.3	26.7	71.3	37.9	55.3	47.1	83.8	52.1	65.3	58.2	56.3	44.1
19	64.3	43.1	40.3	26.6	33.9	17.7	44.3	19.7	36.3	— 2.6	52.3	32.9	50.3	25.7	58.3	42.1	47.3	43.1	84.3	58.2	75.3	51.1	59.3	50
20	65.8	44.1	27.3	19.1	21.4	7.2	33.9	2.5	36.3	27.7	41.6	17.3	48	27.7	72.3	39.9	51.5	43.1	76.3	60	61.3	54.1	73.3	56.2
21	56.3	50.1	32.4	15.7	11.4	— 2	17.8	— 7.1	31.4	9.6	35.3	11.6	32.4	27.2	65.3	35.9	63.3	46.1	77.1	52.1	72.8	51.3	67.1	49.1
22	59.3	46.1	24.4	13.6	19.8	— 4.5	36.1	17.7	34.3	15	32.3	16.1	39.3	23.7	50.3	44.1	82.3	51.2	77.3	53.1	68.3	45.1	64.3	40.1
23	63.3	35.9	21.4	5.8	29.4	14.6	43.3	34.9	17.4	12.4	30.4	8.6	47.2	22.5	55.3	37.9	82.3	61.1	79.3	48.1	68.5	44.1	69.3	35.9
24	61.3	38.7	24.5	1.6	28.4	2	40.6	9.8	21.4	— 1	14.4	2.5	46.3	23.7	57.3	34.4	61.1	49.6	85.3	55.1	69.8	42.6	71.3	43.6
25	53.7	36.1	32.4	24.5	8.3	—10.8	12.9	— 4.1	20.4	— 9.6	32.3	0.6	49.3	25.7	60	30.2	52.3	41.1	88.3	58.2	72.9	42.6	73.8	40.4
26	47.3	26.7	27.4	12.5	18.4	8.3	—4.1	—19.3	22.4	— 2.5	32.4	24.7	33.4	27.2	72.3	46.9	68.3	46.1	83.3	57.2	73.3	45.1	69.3	48.9
27	59.3	33.9	26.4	13.6	29.4	12.6	1.0	—21.8	29.4	— 0.5	30.4	12	46.3	27.2	72.3	51.9	82.3	43.1	84.3	56.2	75.3	42.1	.....	.....
28	54.3	41.1	28.4	12	25.7	13.6	15	1	16.4	—11.3	34.3	4.6	49.3	30.2	84.3	52.1	61.8	52.6	65.3	59	80.1	44.1	.....	.....
29	45.3	33.9	16.4	8.8	26.4	5.5	19.4	3.5	.....	.....	24.4	6.6	45.3	28.7	69.3	43.6	69.3	46.1	64.3	58.2	65.3	49.6	.....	.....
30	45.3	28.9	9.4	—2	18.4	— 1.6	7.3	—14.1	.....	.....	37.3	5.6	54.3	31.1	62.3	35.9	55.3	46.1	71.3	56.1	71.1	59.2	.....	.....
31	42.3	27.7	.....	.....	31.4	2.5	1.5	—33.3	.....	.....	26.2	5.3	.....	.....	58.3	44.3	.....	.....	82.3	52.6	75.3	58	.....	.....
Range	50°		51°.3		70°.6		84°.6		75°.3		79°.3		61°.2		60°.6		47°.4		43°.2		.....		.....	
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

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Maximum, minimum, and mean temperatures—Continued.

CHEYENNE, W. T.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	67	30	51	24	46	26	51	27	33	6	53	23	36	13	72	35	63	44	94	54	77	52	70	44
2	72	38	50	27	39	− 7	51	32	32	15	55	27	50	21	47	33	72	46	96	56	84	50	39	33
3	75	46	60	27	16	− 9	39	4	31	5	35	23	50	33	46	28	79	46	96	50	89	49	49	32
4	79	43	56	37	30	10	28	7	24	7	32	13	45	25	64	23	74	49	98	48	88	60	71	44
5	63	35	56	28	32	8	39	11	27	12	32	4	51	25	71	32	78	48	89	59	82	61	78	45
6	75	37	62	35	35	13	47	13	40	16	25	− 3	35	20	79	34	76	49	91	54	77	54	82	48
7	80	45	58	31	38	10	50	29	47	21	36	5	37	24	84	40	84	49	91	54	85	52	85	48
8	64	41	62	37	38	23	44	35	34	9	43	7	45	30	80	40	76	47	90	54	90	53	82	46
9	70	39	65	32	39	10	47	33	37	15	44	22	53	30	64	39	61	49	91	52	87	52	83	49
10	71	38	60	32	38	13	48	25	52	32	38	20	68	33	50	29	57	38	91	50	84	56	70	41
11	66	32	44	24	34	15	27	22	52	29	49	24	66	30	58	33	67	34	92	51	85	49	64	43
12	76	38	57	44	24	10	53	19	30	13	53	27	53	35	50	36	80	42	91	63	93	44	64	32
13	62	35	64	33	49	17	30	9	40	12	56	24	49	32	65	40	65	45	93	62	83	54	69	48
14	72	31	62	30	49	13	36	5	47	19	45	21	46	22	63	42	58	44	86	63	91	51	61	34
15	42	29	60	35	50	27	55	29	43	23	48	13	46	25	70	30	72	40	86	52	90	54	78	35
16	45	28	62	35	42	24	57	36	45	12	48	26	36	15	76	34	85	44	91	47	90	59	73	42
17	42	27	50	24	41	20	49	31	48	22	32	21	45	15	79	43	91	54	88	53	75	52	66	36
18	41	25	39	13	35	18	39	19	46	19	32	− 3	55	19	81	42	85	52	83	60	88	50	48	33
19	60	24	55	22	29	20	46	18	36	18	33	7	51	25	77	44	92	51	68	50	89	58	60	29
20	67	38	48	23	34	17	41	5	34	9	43	15	36	25	80	45	96	55	78	55	82	58	53	36
21	62	20	49	23	46	14	22	7	15	1	37	18	35	29	76	46	95	65	80	58	81	57	69	37
22	27	13	49	19	40	12	27	− 4	12	−12	47	15	35	9	79	50	93	60	83	57	88	48	64	36
23	42	15	47	18	32	18	16	4	10	− 8	44	24	42	12	88	49	94	59	84	56	87	50	70	37
24	16	8	55	15	45	16	41	5	8	−24	53	26	57	28	79	49	89	58	86	62	85	49	77	34
25	23	5	56	30	48	27	49	10	28	−10	48	25	65	32	88	60	91	49	79	52	77	60	75	40
26	32	5	57	18	30	18	51	19	36	15	43	16	65	37	85	49	90	52	55	47	79	53	68	37
27	37	22	27	5	50	13	39	25	44	10	49	26	64	32	88	53	74	55	81	51	78	55	76	31
28	50	26	46	5	52	25	47	25	48	27	35	18	70	33	81	52	75	42	83	54	77	48	80	39
29	50	34	58	37	37	21	45	28	.....	.....	42	19	73	40	69	45	83	50	91	58	84	45	81	42
30	41	25	56	30	53	20	37	16	.....	.....	30	13	80	45	56	43	84	42	90	61	78	50	81	36
31	51	24	.....	.....	50	31	30	21	.....	.....	31	8	.....	.....	57	48	.....	.....	76	56	83	52	.....	.....
Range	75°		59°		62°		61°		76°		58°		71°		65°		62°		51°		49°		56°	
Monthly means	42°. 5		40°. 1		27°. 6		30°. 4		22°. 9		28°. 9		39°		56°. 6		65°. 2		71°. 8		68°. 6		54°. 2	

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Maximum, minimum, and mean temperatures—Continued.

CHICAGO, ILL.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	55	43	44	25	43	34	43	35	26	20	48	39	41	22	44	38	61	46	87	69	75	68	77	67
2	64	50	48	37	57	43	46	40	30	25	58	41	43	32	44	40	60	47	73	62	68	64	84	66
3	65	54	44	28	60	35	60	46	33	25	53	31	32	23	46	41	71	59	94	61	69	64	76	61
4	56	48	59	38	24	17	36	16	32	19	31	25	37	23	44	41	87	63	92	66	70	63	67	62
5	57	45	39	37	28	13	30	14	33	15	47	31	32	24	51	40	72	57	78	64	73	66	72	59
6	47	39	48	35	37	13	32	16	36	28	51	39	46	25	46	40	63	55	99	72	73	67	84	62
7	61	35	56	41	37	23	37	23	33	29	48	29	40	31	70	42	82	63	97	70	74	68	89	67
8	69	45	49	40	47	33	41	25	36	31	37	18	45	30	81	55	90	64	82	70	74	64	84	70
9	75	50	42	35	39	30	36	27	25	11	31	21	33	27	79	60	75	54	75	70	85	66	81	70
10	70	57	44	36	36	27	38	21	36	20	35	27	54	29	80	64	64	50	81	69	80	66	82	70
11	67	51	44	36	45	35	23	14	40	21	36	22	36	32	72	61	66	57	70	64	98	75	82	70
12	53	43	30	24	38	36	29	10	56	39	29	17	46	29	69	61	62	50	69	63	87	76	87	68
13	68	44	30	14	30	20	34	22	37	29	30	17	67	41	66	51	70	57	84	62	81	66	75	69
14	61	52	34	15	31	17	12	0	47	29	43	23	62	45	54	46	69	61	93	71	70	69	73	65
15	75	53	57	29	44	28	10	— 6	47	35	46	36	45	35	56	45	78	63	87	70	75	65	65	54
16	67	56	52	32	46	29	30	5	35	26	49	36	37	32	55	45	68	65	75	62	82	67	64	59
17	68	56	47	37	47	37	43	22	33	27	64	42	42	35	55	43	86	59	81	60	91	70	70	63
18	59	45	38	23	38	34	38	36	39	27	58	39	60	36	51	39	78	71	89	68	75	71	74	64
19	49	37	23	15	36	24	34	30	44	37	45	34	42	34	62	50	83	71	92	77	93	72	71	55
20	48	36	31	11	22	18	39	32	36	31	53	33	49	35	56	47	83	68	80	66	74	72	64	44
21	51	36	38	30	25	16	42	39	36	33	46	35	52	35	56	44	82	71	74	65	91	69	68	51
22	65	38	43	25	37	24	37	34	38	34	48	32	51	40	66	44	90	71	80	65	71	65	72	56
23	47	28	37	34	39	23	31	22	29	17	34	20	43	30	71	57	94	73	86	72	70	64	74	58
24	57	36	38	30	41	33	14	5	22	9	37	17	42	30	78	60	88	75	89	72	69	58	72	62
25	52	44	33	30	38	33	25	8	26	16	48	30	50	38	74	60	89	71	98	76	77	65	76	67
26	58	41	42	29	37	33	42	25	41	15	45	30	43	37	61	55	82	71	88	69	75	67	77	60
27	49	33	33	25	31	23	43	37	40	18	41	23	41	35	87	56	95	71	69	63	76	64	63	53
28	40	26	18	8	31	18	35	24	51	30	38	25	39	35	81	68	93	75	72	62	83	69	60	50
29	38	24	32	12	24	15	36	29	.....	.....	44	23	46	34	88	63	82	63	78	60	78	66	66	51
30	46	28	35	29	37	13	24	22	.....	.....	50	33	59	35	89	72	81	62	87	65	71	68	59	44
31	31	23	.....	.....	37	22	25	22	.....	.....	37	27	.....	.....	80	62	.....	.....	86	70	69	65	.....	.....
Range	52°		51°		47°		66°		47°		47°		45°		51°		49°		39°		40°		45°	
Monthly means	49°. 1		34°. 4		32°. 4		29°. 1		31°. 5		36°. 3		38°. 7		58°. 5		70°. 2		74°. 7		71°. 9		66°. 8	

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Maximum, minimum, and mean temperatures—Continued.

CINCINNATI, OHIO.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	65	46	49	27	58	38	45	41	37	24	54	35	39	26	77	55	80	63	89	68	85	70	86	64
2	70	50	58	35	68	51	54	41	39	33	56	36	53	32	64	54	75	60	89	69	82	64	88	62
3	75	51	52	40	68	57	64	53	47	30	62	43	55	33	61	48	86	66	91	68	81.5	66	88	67
4	69	58	60	36	59	31	64	30	35	31	57	40	51	28	62	44	93	71	98.5	68	82	64	86	66
5	73	51	58	40	38	29	37	27	39	31	54	35	58	32	66	43	94	68	93	77	81	63	81	72
6	59	42	56	36	40	27	37	30	39	31	62	45	50	33	69	45	90	74	98	69	83	67	86	69
7	57	35	57	42	42	35	34	30	38	30	58	41	57	41	72	46	96	74	103	73	85	72	88	66
8	66	41	56	46	61	41	41	28	35	28	42	30	53	44	82	55	98	78	94.5	76	85	68	88	69
9	72	44	52	40	58	40	46	38	35	23	46	29	50	32	83	60	96	78	94	77	92	66	92	68
10	78	51	48	35	46	37	46	32	46	22	50	35	51	30	88	59	94	73	82	73	86	69	86	67
11	68	56	53	37	63	45	37	27	54	34	41	25	60	33	87	60	88	72	77	69	96	75	89	62
12	59	43	53	30	62	59	30	20	60	45	40	27	52	28	88	63	76	60	79.5	64	96	76	89	63
13	65	40	40	27	59	34	38	28	59	40	34	23	70	39	85	68	78	56	89	66	97	74	92	64
14	71	48	42	28	41	28	30	16	50	34	41	23	75	53	84	63	85	60	94	71	86	70	86	68
15	74	49	62	25	49	32	16	6	59	36	48	35	66	49	85	63	89	68	90	77	82	66	85	69
16	76	54	59	46	52	35	21	7	48	36	57	40	51	38	70	58	89	68	85	70	90	63	71	64
17	77	63	48	41	56	35	37	14	36	27	70	50	48	37	65	54	89	65	86.5	65	92	66	76	63
18	69	51	43	34	53	37	44	24	42	26	67	56	62	39	64	46	92	65	92	65	92	69	83	66
19	55	47	34	22	50	36	50	39	55	38	65	42	58	49	73	44	94	68	95	69	95	71	81	62
20	51	37	34	14	36	28	46	36	56	41	52	39	68	50	76	45	93	69	88	74	95	69	71	53
21	51	37	46	30	34	26	68	45	54	43	61	41	60	39	72	47	95	72	79	69	91	75	69	49.5
22	69	43	48	27	39	30	69	54	47	40	57	37	60	48	73	49	95	71	83	66	81	75	75	51
23	66	39	50	40	44	28	55	33	49	25	50	31	56	42	66	58	97	72	89.5	67	82	72	80	53
24	52	35	52	37	45	32	35	23	45	23	40	19	53	34	86	59	97	77	93	69	81	63	80	61
25	60	35	40	34	45	32	35	18	33	25	58	28	56	45	84	71	93	72	89	72	82	63	82	64
26	61	43	45	32	40	36	50	26	41	15	64	49	61	45	85	63	88	68	96	77	81.5	61	79	66
27	58	42	50	35	35	30	55	40	45	32	49	32	60	45	88	58	95	71	84	66	83	68	73	60
28	44	32	36	28	32	26	50	34	47	33	48	28	50	39	91	58	98.5	77	78	61	74	67	67	55
29	44	27	38	23	38	22	50	34	.....	.....	52	35	53	31	91	61	87	73	82	64	78	67	73	50
30	51	38	39	27	33	16	57	39	.....	.....	57	39	71	40	94	73	88	68	84	61	84	67	63	49
31	49	27	.....	.....	41	20	47	26	.....	.....	50	29	.....	.....	92	71	.....	.....	89	67	86	62	.....	.....
Range	51°		48°		52°		63°		45°		51°		49°		50°		42°.5		42°		36°		43°	
Monthly means	53°.3		40°.9		40°.6		37°.3		39°		44°.3		48°.3		67°.9		79°.6		79°.3		77°.4		71°.9	

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Maximum, minimum, and mean temperatures—Continued.

CLEVELAND, OHIO.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	62	43	49	34	36	27	50	41	24	15	50	34	33	24	52	39	62	53	79	52	77	67	73	42
2	61	40	57	37	57	40	50	40	35	17	54	32	46	27	50	41	67	44	76	64	71	65	77	57
3	71	50	48	33	65	54	65	45	28	22	63	40	40	26	53	38	77	59	76	58	71	52	69.8	60
4	62	57	59	33	55	28	66	32	31	21	40	31	30	22	55	43	86	68	85	64	71	51	68	57
5	65	54	50	34	32	26	37	29	31	22	38	26	43	20	56	41	79	68	77	63	73	49	77	62
6	60	43	44	29	31	25	40	32	28	23	46	35	42	30	56	41	80	67	88	58	78	59	73	57
7	66	43	60	36	41	28	40	31	26	23	49	33	46	35	57	36	90	69	95	74	79	63	79	61.6
8	64	46	56	44	59	35	40	30	29	21	35	26	43	35	76	50	77	65	84	73	77	66	83.5	68.5
9	66	43	49	34	56	38	40	30	30	14	31	24	38	31	73	62	82	62	82	71	79	60	80	63
10	79	51	36	33	45	35	30	27	38	13	35	25	45	32	82	64	74	61	79	69	80	62	76.5	58
11	67	56	43	34	60	35	33	24	36	25	31	20	46	26	73	56	84	61	72	67	91	66	81.5	59
12	59	48	46	30	53	39	28	22	55	17	28	19	44	21	86	59	66	54	70	60	88	74	83	58
13	50	43	30	26	46	30	31	20	56	33	25	15	61	32	78	59	66	50	80	54	75	66	84.5	61
14	65	53	34	23	46	30	28	15	36	29	33	25	72	52	61	49	70	49	27	67	75	62	87	68.5
15	74	43	56	30	54	32	14	11	53	31	45	26	59	35	79	46	82	57	88	71	75	55	80	72.5
16	75	54	46	36	54	32	19	8	48	27	44	36	44	32	68	52	76	66	75	64	76.2	53	66	63
17	70	60	46	39	56	34	30	8	27	22	67	43	40	34	61	48	74	60	73	56	84	59	74	59.5
18	66	51	44	36	48	36	41	24	41	17	61	51	52	33	56	52	78	64	78	59	77	62	75	61
19	50	48	41	27	42	35	45	32	44	34	59	36.5	48	37	61	43	77	57	91	63	89.5	57.2	82	64.5
20	51	39	36	19	32	30	37	28	44	35	43	34	71	40	58	48	76	59	78	65	89.5	75	67	51.5
21	45	36	41	24	36	27	57	35	38	33	51	36	52	36	60	46	77	62	73	62	89.2	70.6	66	47
22	61	41	42	27	37	12	70	37	38	32	51	32	48	40	65	42	86	63	76	53	72.6	63.5	70	46.5
23	61	41	45	30	50	30	46	30	43	25	35.5	24	47	36	73	49	88	70	86	57	70.2	61.6	72	51.5
24	50	39	50	36	42	23	33	17	30	22	38	20	42	33	74	51	81	70	83	65	71	56	72	55
25	51	34	38	31	42	31	21	14	28	24	50	29	46	35	75	51	86	64	80	67	71.5	58.8	78.2	57
26	63	37	38	26	42	31	41	14	31	17	52	32	46	35	66	53	77	66	85	71	71.8	54	81	60.5
27	58	37	45	27	41	33	44	36	35	28	38	30	47	34	74	49	75	63	73	62	76.3	59.2	72	60.5
28	43	32	40	25	41	28	46	30	46	25	50	28	40	33	74	65	96	66	69	62	76	55.5	63.5	56
29	45	32	31	17	41	22	47	29	.....	.....	38	27	45	32	84	65	85	71	75	56	76	54	68	57
30	49	31	36	20	39	22	27	17	.....	.....	47	32	47	33	83	65	74	61	75	55	71	54	55	50
31	44	32	.....	.....	37	26	24	16	.....	.....	40	26	.....	.....	84	63	.....	.....	83	68	73	56	.....	.....
					40																			
Range	48°		43°		53°		62°		43°		48°		52°		50°		32°		43°		42°		45°	
Monthly means	51°.2		36°.6		36°.7		32°.7		31°.2		37°.1		39°.4		59°.6		70°.4		72°.4		70°.2		66°.9	

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Maximum, minimum, and mean temperatures—Continued.

COLORADO SPRINGS, COLO.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	63	41	60	20	(†)	.....	59	21	45	13	82	40	72	52	89	50	92	56	87	55
2	.....	.....	.....	.....	38	− 6	60	38	.....	.....	58	36	54	18	56	30	77	44	90	49	79	54	63	43
3	.....	.....	.....	.....	30	− 5	46	7	31	9	47	26	61	24	54	30	87	50	95	48	84	53. 5	52	39
4	.....	.....	.....	.....	35	− 5	30	− 8	27	19	46	22	48	25	73	27	80	52	96	49	86	56	73	39
5	.....	.....	.....	.....	26	− 3	50	− 3	38	9	29	15	52	20	74	31	86	54	95	53	89	56	77	42
6	.....	.....	.....	.....	30	− 9	40	9	49	7	33	10	50	25	85	40	77	53	94	49	87	56	82	46
7	.....	.....	.....	.....	36	9	55	18	56	22	41	4	38	22	87	40	101	50	92	51	89	56	81. 5	48
8	.....	.....	.....	.....	40	11	53	25	35	22	60	10	42	26	78	50	87	55	93	54	92	57	78	48
9	.....	.....	.....	.....	31	5	58	15	46	8	61	35	60	25	59	37	83	60	95	61	90	55	85	46
10	.....	.....	.....	.....	49	12	60	30	59	25	35	21	66	28	61	36	75	47	89	58	91	52	72	47
11	.....	.....	.....	.....	50	10	49	19	55	29	56	1	62	24	60	36	73	43	98	53	82	53	83	44
12	.....	.....	.....	.....	31	9	47	11	42	18	55	20	55	32	55	37	82	39	97	60	86	56	66	38
13	.....	.....	.....	.....	41	17	29	15	43	14	56	28	54	32	72	44	83	48	96	60	87	52	62	48
14	.....	.....	.....	.....	54	13	25	13	49	10	48	24	49	28	63	39	69	48	93	61	86	56	60	44
15	.....	.....	.....	.....	56	20	58	10	53	25	50	28	35	23	70	35	77	40	81	58	92. 5	57	73	35
16	.....	.....	.....	.....	59	20	61	25	44	20	49	24	42	14	79	38	83	45	82	59	86	58	78	46
17	.....	.....	.....	.....	47	14	63	38	41	21	50	24	38	10	85	46	90	47	87	55	85	60	75	43
18	.....	.....	.....	.....	40	15	49	27	50	20	50	20	43	6	78	42	90	50	94	56	86	55	57	39
19	.....	.....	.....	.....	42	18	29	23	37	23	40	4	54	15	85	45	91	49	87	60	87	60	63	27
20	.....	.....	.....	.....	23	10	47	16	49	12	44	13	42	20	74	47	96	55	88	54	88	57	70	35
21	.....	.....	.....	.....	42	10	36	10	23	3	47	21	35	20	83	46	99	62	84	59	82	56	67	41
22	.....	.....	.....	.....	42	10	26	− 2	12	−10	55	30	30	16	92	45	93	55	93	57	82	56	57	42
23	.....	.....	.....	.....	37	10	30	−15	15	−11	41	11	47	5	86	45	91	52	88	60	85	54	63	45
24	.....	.....	*63	28	42	10	45	− 1	12	− 9	40	10	57	21	76	55	94	53	94	58	82. 5	52	65	41
25	.....	.....	66	27	62	19	55	9	28	−17	52	30	70	35	90	47	95	61	89	60	82	58	76	39
26	.....	.....	66	27	49	10	60	15	48	3	53	27	73	37	83	46	94	52	61	53	78	57	64	46
27	.....	.....	22	9	49	10	50	24	51	12	61	20	72	34	90	45	90	63	78	54	84	56	71	38
28	.....	.....	21	0	61	21	54	16	51	18	60	20	74	32	90	48	79	46	84	53	81	54	77. 5	41
29	.....	.....	57	9	33	11	31	20	.....	.....	48	24	82	34	70	50	88	48	95	52	82	52	77	46
30	.....	.....	64	20	65	9	41	15	.....	.....	35	23	78	41	57	47	86	49	94	61	83	54	75	41
31	.....	.....	.....	.....	63	14	(†)	.....	.....	.....	34	11	.....	.....	70	48	.....	.....	92	56	86	52	.....	.....
Range	.....	.....	.....	.....	74°		78°		76°		60°		77°		65°		62°		50°		40°. 5		60°	
Monthly means	.....	.....	.....	.....	37. °4		26°. 9		30°. 3		25°. 5		34°. 5		58°. 6		68°. 9		73°. 2		73°. 3		56°. 7	

* Station supplied with self-registering maximum and minimum thermometers November 24, 1873.

† No observations taken.

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Maximum, minimum, and mean temperatures—Continued.

DAVENPORT, IOWA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	65	44	42	23	51	30	45	34	25	17	41	36	42	21	64	48	72	55	87	71	80	66	81	59
2	67	52	54	32	59	50	44	34	26	17	56	38	41	30	57	44	65	51	86	66	79	60	84	67
3	60	52	43	23	59	20	60	34	28	14	46	34	42	28	45	40	76	58	95	69	76	61	67	56
4	58	52	57	35	21	9	36	9	25	11	35	25	37	22	53	42	86	60	97	75	80	62	61	56
5	57	43	44	31	23	9	22	5	28	8	43	27	39	25	67	40	75	65	98	70	79	65	74	56
6	49	33	50	38	30	20	36	12	32	25	48	39	41	25	67	45	81	61	98	74	76	69	84	63
7	60	37	58	36	34	26	34	13	32	25	39	23	45	27	74	49	82	66	94	72	82	65	86	68
8	67	45	63	20	45	34	36	23	34	20	30	14	52	34	81	58	85	67	86	72	86	67	89	72
9	74	53	47	36	36	22	34	26	25	5	36	22	43	26	81	62	78	62	86	72	86	68	84	70
10	74	58	48	36	36	22	22	22	40	20	36	28	55	31	71	59	78	55	82	68	93	71	84	71
11	65	48	45	34	40	35	23	9	43	26	35	24	49	30	72	57	70	55	77	64	95	80	85	73
12	60	38	32	19	36	29	25	7	49	31	28	16	52	30	77	61	69	50	82	56	92	74	81	69
13	72	48	29	18	30	16	26	7	31	18	32	12	63	42	75	54	71	53	88	66	87	72	75	65
14	71	48	38	19	33	17	7	−7	40	16	39	25	55	41	72	56	70	60	93	75	81	65	74	53
15	72	54	62	33	41	23	6	−10	39	27	46	36	55	34	63	52	74	64	83	67	84	66	62	43
16	69	60	46	38	45	33	22	2	33	23	49	39	42	33	70	49	72	61	78	64	89	66	67	48
17	68	55	45	34	42	33	35	20	34	21	62	46	52	30	64	54	84	60	83	64	91	68	73	53
18	55	43	35	15	34	30	40	35	33	21	57	35	61	41	64	47	86	65	89	69	88	66	66	60
19	48	35	18	6	31	18	40	27	41	32	41	29	52	40	71	53	88	66	88	77	91	74	62	51
20	51	37	33	14	18	5	37	26	34	16	52	32	43	36	69	50	90	68	78	64	93	73	63	43
21	56	35	40	24	27	11	39	35	33	28	47	33	49	35	68	50	91	70	76	65	93	76	66	54
22	48	32	39	26	38	24	36	25	35	25	42	27	54	38	72	51	91	73	83	64	82	65	71	53
23	46	26	36	29	37	33	25	7	34	4	28	18	45	29	82	60	93	73	90	69	77	63	75	57
24	53	32	42	26	37	34	12	3	12	−5	37	18	54	36	84	64	91	75	86	75	75	60	76	57
25	55	37	36	27	38	32	20	5	18	2	43	30	53	40	86	60	90	74	96	79	78	58	70	66
26	50	36	43	30	33	25	41	18	30	14	41	24	55	37	83	57	93	77	87	70	72	61	71	57
27	36	30	33	18	28	17	41	29	37	13	37	30	47	33	90	70	92	79	78	63	70	64	60	51
28	35	26	23	7	35	14	29	21	39	29	37	21	48	30	89	73	86	70	80	59	69	66	66	45
29	39	23	34	17	32	14	38	24	.....	.....	42	25	55	40	86	70	81	60	83	65	75	67	72	52
30	39	22	36	22	33	13	27	15	.....	.....	48	35	74	48	90	71	87	63	92	72	77	64	67	44
31	33	18	.....	.....	40	28	24	7	.....	.....	40	25	.....	.....	83	66	.....	.....	83	69	74	60	.....	.....
Range	56°		57°		54°		70°		54°		50°		53°		50°		43°		42°		37°		46°	
Monthly means	48°.3		34°.6		29°.7		23°.7		25°.9		34°.9		41°.6		64°.5		73°.2		78°		74°.4		65°.5	

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Maximum, minimum, and mean temperatures—Continued.

DENVER, COLO.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	71	36	51	28	59	31	58	37	39	3	60	14	47	21	75	44	73	49	92	59	81.9	58.8	82.8	56
2	80	36	56	27	44	5	59	41	40	9	60	22	60	27	58	39	81	47	98	61	91.4	59.2	63.5	39.5
3	83	40	71	26	12	− 3	47	2	31	9	48	23	65	28	56	34	85	50	101	59	86	61.9	56.1	37.5
4	83	48	64	31	22	1	21	− 7	30	14	43	25	49	31	68	29	82	52	102	61	89	65.6	80.4	40.5
5	67	43	66	26	19	− 5	46	− 4	35	11	34	12	54	25	81	34	85	56	97	64.5	83.8	60.8	87	47.1
6	82	35	68	39	27	6	39	10	50	17	37	17	44	26	81	39	84	52	98.5	58.5	87.7	57.5	89.6	49.2
7	86	48	68	29	29	4	53	20	52	27	34	17	41	20	87	49	97	55	97	59	92	58.2	91.8	52
8	77	51	68	32	40	12	50	35	35	23	49	21	49	34	82	54	85	59	99	64	96.3	62.5	85	53.1
9	80	45	71	34	23	3	54	29	51	7	52	36	64	28	59	47	70	53	97	63	91.3	61.2	92	52.5
10	72	37	68	32	31	2	56	33	54	30	42	26	74	28	64	43	74	47	98.5	60	94.4	58.3	83.1	46
11	70	34	49	28	28	6	37	23	60	31	60	25	66	40	65	39	73	40	98.5	58	91.6	56.7	79.5	49
12	83	36	55	17	27	3	46	19	33	13	62	32	52	40	52	39	89	49	99	63.5	87.4	53.5	76.3	42.5
13	69	41	71	32	37	6	34	18	35	4	59	32	59	36	74	42	74	51	96	66	84	56.2	68.3	49.5
14	74	34	71	30	38	1	26	15	50	14	48	32	56	26	68	40	67	48	92	66	94.8	56.5	71.8	46
15	54	36	62	31	39	8	52	19	54	27	56	26	41	28	77	36	89	44	91	59	96.5	60	85.4	40
16	48	30	67	34	42	14	62	32	47	28	52	30	40	32	83	44	88	49	94	59	93.6	68.4	78.5	58
17	52	31	65	31	42	5	51	35	55	24	44	26	43	14	83	47	94	55	94	62	77	59.5	75.5	37
18	50	26	45	15	36	10	46	27	55	28	40	26	52	20	89	48	89	57	90	64.5	90.3	52	56.1	40.6
19	67	25	58	23	31	9	30	18	43	19	42	16	60	29	87	45	93	56	79	62	89.2	58.5	70.5	34.6
20	76	32	52	26	25	2	47	11	45	14	51	20	46	32	85	50	94.5	53.5	85.8	55	86.8	58.8	66.2	36
21	58	24	47	21	33	10	31	18	17	0	47	26	35	24	82	49	95.5	61	79.2	62.6	90	59.7	70.5	43.5
22	34	8	39	25	34	6	28	11	20	− 1	56	26	40	32	88	48	98.5	55	84.8	61.6	89.2	56	58.5	45
23	45	16	48	17	36	8	27	14	10	− 2	45	28	51	32	91	54	93	63	84.3	61.8	92.8	61.7	74.6	45
24	37	13	60	27	32	5	49	11	12	− 8	58	30	62	33	85	54	95	56	90.4	61.2	87	55.5	80	39
25	35	5	58	36	53	25	53	15	24	−11	55	35	73	34	90	53	98.5	58	86	59.6	86	65.6	85.8	41.5
26	43	14	59	26	42	16	53	20	34	0	45	31	74	38	84	57	92.5	57.5	64	51	81.5	63.5	71.5	42
27	50	28	28	10	36	11	47	33	38	0	59	27	69	37	92	56	87	66	84.2	51.8	88	56.2	80.9	37.5
28	59	37	54	− 1	47	25	56	23	39	13	52	35	80	36	85	52	82	49	86.2	57.8	87.5	52.6	85	39.8
29	62	33	62	30	30	20	57	29	.....	.....	46	24	82	41	74	48	91	53	96.8	60.8	91.2	51.2	86	45
30	52	27	61	29	58	13	44	21	.....	.....	42	21	83	42	61	47	87	54	94.2	65	84.2	63	85	44
31	52	22	.....	.....	58	33	40	18	.....	.....	39	17	.....	.....	64	52	.....	.....	87.8	63	88.9	58.1	.....	.....
Range	81°		72°		64°		69°		71°		50°		69°		63°		58°.5		51°		45°.3		57°.4	
Monthly means	45°.2		40°.6		22°.4		31°.5		24°.7		36°.4		43°.1		61°.9		70°		76°.1		73°		59°	

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Maximum, minimum, and mean temperatures—Continued.

DETROIT, MICH.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	65	41	40	27	31	12	41	30	23	10	51	35	41	14	58	34	61	49	81	59	81	63	78	56
2	61	39	45	31	54	26	46	34	22	10	47	32	42	28	50	36	66	41	74	61	73	57	84	59
3	68	46	44	34	57	49	58	43	27	17	52	36	38	20	52	32	76	57	75	56	72	42	68	52
4	62	52	56	34	49	29	58	24	30	18	36	25	30	9	50	43	84	60	91	64	72	49	69	47
5	62	45	42	28	28	18	28	20	28	18	36	24	29	23	61	41	81	65	80	56	70	54	77	61
6	46	35	41	25	29	19	32	26	24	15	37	31	45	25	51	35	79	64	91	63	76	61	79	56
7	58	28	55	35	34	19	35	30	26	16	47	32	47	30	58	30	84	67	97	71	80	63	88	61.5
8	71	42	46	40	50	24	41	26	34	8	32	17	47	33	81	47	74	61	87	70	80	61	92	66
9	72	43	43	31	52	35	39	29	31	18	35	21	37	26	85	58	85	58	83	68	84	61	87	64
10	78	54	37	21	42	32	31	26	34	11	37	17	49	25	84	64	72	53	82	68	86	67	88	64
11	61	52	42	32	49	34	31	22	31	18	32	15	45	23	80	60	77	58	71	59	88	69	88	59
12	51	39	35	21	45	35	31	20	51	21	25	12	40	23	85	58	60	49	62	57	88	69	88	63
13	61	35	29	14	37	26	27	17	51	36	27	13	63	28	81	50	68	45	82	55	74	60	97	61
14	65	56	34	11	32	23	26	11	40	24	40	18	73	50	62	43	72	56	89	66	74	53	86	64
15	74	45	52	26	45	26	14	6	48	31	43	27	55	32	73	42	66	60	86	72	77	52	72	53
16	73	55	45	34	47	30	22	0	43	24	43	31	38	29	57	40	76	62	72	56	82	56	67	46
17	66	55	45	33	50	32	32	13	26	16	64	35	49	32	58	44	78	57	75	55	85	60	68	58
18	68	46	40	29	39	31	40	17	32	15	67	48	54	36	59	42	83	63	83	61	79	67	78	64
19	49	36	32	18	40	32	44	25	41	31	54	36	40	33	65	36	80	64	89	67	86	59	82	58
20	42	34	30	13	23	23	30	18	41	30	47	31	60	35	60	49	84	65	76	64	93	68	64	49
21	38	31	37	21	26	21	52	30	34	31	53	36	49	33	62	43	87	63	73	58	77	65	67	41
22	61	35	41	25	43	28	52	35	36	28	49	28	52	35	68	48	89	65	80	56	72	61	68	50
23	61	33	36	29	39	20	41	26	35	22	31	18	43	30	72	54	91	69	83	57	76	60	77	50
24	53	30	35	30	40	26	31	12	29	19	35	14	42	27	71	55	81	70	85	68	72	56	81	53
25	50	33	36	24	40	30	18	10	26	17	46	26	43	33	68	57	83	65	75	67	73	54	83	51
26	52	36	35	17	40	30	40	12	32	13	50	30	50	36	73	50	82	63	84	70	75	55	78	66
27	44	35	28	27	36	29	44	32	36	25	40	25	42	28	83	50	78	59	70	60	76	62	69	57
28	37	28	34	15	32	22	42	26	46	26	38	26	41	30	89	59	93	67	73	57	75	60	66	51
29	40	22	35	7	33	18	39	21	.....	.....	41	23	47	26	85	65	83	66	77	54	75	59	70	44
30	43	31	28	17	26	12	24	10	.....	.....	46	27	52	30	87	62	71	55	75	59	77	55	57	43
31	34	24	.....	.....	36	15	20	10	.....	.....	31	22	.....	.....	85	57	.....	.....	83	67	74	58	.....	.....
Range	56°		49°		45°		58°		43°		55°		64°		57°		49°		43°		41°		56°	
Monthly means	47°.9		32°.2		32°.7		28°.9		27°.5		34°.4		37°.3		59°		68°.9		71°.4		67°.9		66°.7	

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Maximum, minimum, and mean temperatures—Continued.

DUBUQUE, IOWA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	54	86	65	81	63	85	57
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	54	86	61	80	59	82	65
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	55	99	66	75	62	68	54
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	64	99	75	83	59	59	54
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	60	101	78	77	63	75	50
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	62	100	70	83	66	87	61
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	67	98	72	81	61	90	65
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*87	65	84	69	85	70	87	62	90	66
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	65	68	63	87	70	88	62	87	67
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	63	63	51	83	66	90	69	85	72
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	64	57	50	80	62	97	75	88	69
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	58	64	53	83	56	96	75	72	64
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69	54	73	56	92	63	96	68	75	62
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	55	73	58	96	72	81	62	72	51
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63	53	75	59	85	68	84	66	65	43
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	45	70	58	80	58	93	63	67	43
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64	42	86	63	90	62	88	70	74	51
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	44	87	70	91	68	88	62	65	57
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	49	90	74	85	73	95	79	61	51
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	48	91	70	76	65	96	71	64	42
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	49	95	68	85	62	96	72	64	46
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	56	90	70	86	62	70	65	74	54
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	55	95	79	93	67	82	62	78	56
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	65	98	79	90	72	79	60	77	54
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	64	93	78	100	81	81	54	70	60
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	62	97	77	87	68	72	60	66	56
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	68	97	80	78	63	75	59	61	50
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	75	80	69	83	61	75	66	66	46
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	74	85	55	87	61	79	66	69	47
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	73	87	60	92	65	79	65	67	41
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	67	.....	.....	86	64	80	55	.....	.....
Range	.....		.....		.....		.....		.....		.....		.....		.....		48°		45°		44°		49°	
Monthly means	46°.6		31°.3		28°.7		21°.2		24°		33°.6		41°.7		65°.3		71°.7		80°		74°.2		65°.5	

*Station supplied with maximum and minimum thermometers May 8, 1874.

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Maximum, minimum, and mean temperatures—Continued.

DULUTH, MINN.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1		*															58	42	71	48	72	58	73	60
2																	48	41	65	53	68	55	67	53
3																	61	42	65	50	68	55	69	45
4																	77	44	68	50	65	55	65	51
5																	71	49	83	51	64	59	71	54
6																	55	46	82	62	75	56	69	53
7																	64	46	89	65	77	62	71	57
8																	54	45	73	58	86	61	90	61
9																	66	47	85	56	80	63	85	66
10																	53	45	78	61	75	60	74	69
11																	51	42	75	56	70	64	72	65
12																	71	42	71	57	65	56	70	57
13															*58	40	60	51	89	60	64	53	66	57
14															45	37	55	47	80	68	63	52	59	46
15															50	37	52	46	76	60	68	55	61	39
16															55	36	71	46	79	55	76	59	67	45
17															57	39	75	54	79	56	74	60	58	52
18															48	36	67	49	69	59	75	52	61	49
19															70	40	70	53	74	61	77	58	55	45
20															62	44	78	62	78	54	70	59	57	39
21															69	43	71	58	85	63	79	57	60	43
22															51	43	81	56	84	62	61	54	68	52
23															51	42	75	60	83	68	69	54	77	48
24															63	42	61	53	74	61	67	53	70	53
25															75	53	87	54	89	62	75	57	67	57
26															59	46	78	55	73	61	73	61	63	54
27															91	47	69	55	77	53	68	59	56	49
28															76	45	65	53	75	55	67	64	71	48
29															47	42	76	57	71	57	76	63	65	42
30															80	44	64	50	84	59	74	56	66	43
31															69	55			81	59	70	52		
Range																	46°		41°		34°		51°	
Monthly means	43°.5		24°.5		19°.7		13°		16°.3		23°.8		32°.8		56°.2		57°.8		67°.9		64°		59°.4	

*Station supplied with maximum and minimum thermometers May 13, 1874.

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Maximum, minimum, and mean temperatures—Continued.

EASTPORT, ME.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	51	(*)	48	.....	6	.....	39	26	10	− 6	34	12	22	2	44	35	57	42	67	48	66	56	66	54
2	56	.....	49	.....	25	.....	39	33	6	−13	39	29	33	17	46	31	58	39	56	47	71	56	64	50
3	51	.....	54	.....	43	.....	39	30	29	2	43	33	37	24	50	33	67	43	51	47	68	54	65	50
4	54	.....	50	.....	53	.....	49	39	25	14	45	39	29	14	59	40	56	45	59	46	68	50	61	44
5	60	.....	45	.....	46	.....	50	29	15	0	40	20	34	11	51	37	63	46	55	46	67	55	62	46
6	56	.....	35	.....	30	.....	30	15	8	− 6	29	11	41	29	51	35	59	45	63	48	61	51	62	49
7	56	.....	40	.....	25	.....	46	30	10	− 6	32	12	38	30	47	36	57	48	58	46	67	54	69	51
8	56	.....	46	.....	30	.....	51	43	23	2	32	26	40	32	51	35	62	45	77	46	60	56	67	54
9	52	.....	44	.....	42	.....	45	34	29	12	36	26	39	16	51	34	62	45	77	56	59	54	62	52
10	55	.....	32	.....	37	.....	41	31	29	23	32	25	34	25	53	41	51	42	71	56	70	54	78	53
11	57	.....	28	.....	34	9	37	32	27	10	34	17	35	22	56	38	63	43	69	51	70	56	62	50
12	56	.....	51	.....	37	30	33	16	22	6	25	10	36	17	64	38	50	43	64	49	64	52	61	47
13	52	.....	44	.....	35	24	20	13	22	14	24	8	37	14	55	40	61	43	63	50	61	53	61	45
14	56	.....	29	.....	29	15	25	13	47	31	34	19	44	31	70	41	66	46	77	52	56	52	67	50
15	52	.....	23	.....	21	5	16	8	32	24	36	19	48	35	64	41	71	53	78	58	65	54	65	52
16	54	.....	29	.....	38	7	13	2	31	26	41	26	45	35	47	39	74	50	70	53	71	53	61	55
17	49	.....	36	.....	36	28	18	0	31	20	41	27	39	28	50	40	55	49	71	58	68	51	58	52
18	51	.....	50	.....	36.5	28	34	11	26	12	42	35	44	30	55	39	56	45	71	51	67	54	55	49
19	61	.....	37	.....	35	28	41	32	34	17	42	31	43	32	48	40	53	47	71	49	70	56	55	50
20	61	.....	29	.....	32	23	40	10	40	33	42	25	43	32	59	39	52	45	62	52	64	55	58	53
21	55	.....	30	.....	26	7	35	7	35	30	38	21	36	39	57	41	61	47	66	49	72	57	65	52
22	58	.....	34	.....	23	10	40	35	34	30	37	20	44	32	54	42	68	48	73	51	66	54	60	47
23	55	.....	26	.....	29	8	45	39	31	25	27	20	42	29	58	45	63	47	73	55	64	48	60	45
24	57	.....	32	.....	32	24	41	21	32	13	22	2	44	34	58	42	65	52	69	51	66	50	61	46
25	54	.....	28	.....	30	15	28	− 3	20	7	36	8	46	30	50	41	69	47	70	51	66	50	59	49
26	47	.....	26	.....	25	11	− 3	−20	24	12	44	19	36	28	53	45	72	49	70	52	64	50	57	53
27	59	.....	31	.....	28	14	29	−20	32	12	38	24	46	28	63	44	73	47	68	52	69	51	58	50
28	52	.....	20	.....	40	19	32	16	20	5	34	24	49	34	66	45	65	49	67	49	69	50	60	52
29	52	.....	18	.....	34	18	18	10	.....	.....	28	21	49	33	61	45	54	48	68	55	63	55	68	55
30	43	.....	12	.....	29	3	20	− 3	.....	.....	37	21	48	33	61	44	55	45	69	56	69	55	61	51
31	45	.....	.....	.....	29	6	20	−10	.....	.....	31	12	.....	.....	65	44	.....	.....	72	56	63	54	.....	.....
Range	.....		.....		.....		71°		60°		43°		47°		39°		35°		32°		24°		34°	
Monthly means	49°.3		29°.2		25°.6		25°.5		20°.9		29°.4		33°.4		47°.7		54°.7		59°.6		59°.2		56°.3	

* Minimum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

ERIE, PA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	60	48	41	30	35	32	40	36	21	8	47	34	34	20	50	37	.....	56	.....	57	.....	68.5	76	61
2	58	46	53	35	55	35	46	38	30.5	9	57	37	41	29	46	38	.....	51	.....	65	.....	63.5	80	59
3	63	50	48	34	65	51	60	45	31	21	59	42	39	24	51	34	.....	61	.....	60	.....	54	74	64
4	64	56	55	34	65	30	70	30	30	20	53	26	25	15	56	44	.....	65	.....	67	72	60	68	56
5	61	53	49	35	31	26	31	27	26	14	32	23	40	16	58.5	40	.....	69	.....	63	71	55	81.5	63
6	53	41	40	32	32	26	37	27	25	13	41	31	40	28	48	37	.....	64	.....	62	74	65	76	66
7	52	37	56	35	40	25	37	32	26	20	53	34	44	34	52	31	.....	69	.....	72	80	65	76	66
8	60	50	49	41	55	35	37	32	24	12	35.5	23	42	33	65	45	.....	66	.....	75	78	69	78	71
9	66	46	44	33	57	38.5	41	32	30	13	25	18	37	31.5	76	63	.....	67	.....	72	79	65.5	78	68
10	76	57	37	31	39	35	36	28	28	15	27	24	41	29	79	65	.....	64	.....	68	81	68	79	66
11	66	55	40	32	52	36	34	26	28	18	26	12	42	25	70	53	.....	57	.....	67	90	66	81	70
12	55	44	41	30	49	37	28	22	50	18	26	11	34	17	81	57	.....	54	.....	59	87	79	81.5	66
13	57	39	31	22	39	28	29	19	53	30	22	11	59	25	75	57	.....	50	.....	58.5	78	66	82	70.5
14	61	50	31	22	34	29	28	16	32.5	25.5	32	20	71.5	49	64	51	.....	52	.....	66	76	59.5	87	71
15	65	46	46	26	42	32	16	11	47	31	37.5	20	59	34	(*)	51	.....	56	.....	76	79	59	82	64
16	74	58	48	39	45	34	21	11.5	43	25	43	37	37	31	.....	52	.....	66	.....	65	80	60	72	64
17	64	55	49	36	49	35	29.5	8	27	* 20	60	39	36.5	32.5	.....	45	.....	59	.....	60	84	65	70	63
18	68	53	40	32	46	36	42	23	34	13	63	51	42	32	.....	43	.....	61	.....	62	.....	.....	72	63
19	54	45	35	26	38	35	44	31.5	44	32	60	36.5	47	38	.....	38	.....	57	.....	62	84	61	84	62
20	46	36	28	20	36	25	35.5	22	43	35	38.5	33	70	39	.....	45	.....	60	.....	67	86	77	69	60
21	42	38	35	20	30	24	56	35	38	33	50	34	50	34	.....	46	.....	62	.....	64	83	69	65	56
22	60	39	40	28	31	24	67	41	35	31	46	31	46	37	.....	46	.....	64	.....	61	75	65	68	55
23	62	46	40	29	35	23	52	29	48	25.5	31	19	46	37	.....	48	.....	74	.....	60	72	63	70	59
24	48	38	43	34	38	25	34	17	28	22	28	17	40	31	.....	53	.....	66	.....	60.5	73	61	73	59
25	51	40	37	24	37	32	17	13	30	21	49	26	43	34	.....	54	.....	64	.....	73	74	58	76	63
26	57	37	29	25	37	31	38	9	29	10	49	26	40	33	.....	50	.....	66	.....	72	76	59	80	65
27	57	41	35	23	37	32	42.5	37	32	25	37	26	44	31	.....	46	.....	65	.....	65	78	61	72	64
28	43	31	32	24	33	25	43	27	38	25	35	27	38	33	.....	61	.....	68	.....	63.5	75	57	72	60
29	38	30	29	21	32	20	38	22.5	.....	.....	37	24	38	31	.....	65	.....	70	.....	63	75	59	66	59
30	44	30	30	22	26	18	23	10	.....	.....	42	31	40.5	31	.....	65	.....	58	.....	61	76	57	61	50
31	46	30	.....	.....	38	18	21	8	.....	.....	33	24	.....	.....	.....	64	.....	.....	.....	68	78	61	.....	.....
Range	46°		35°		39°		62°		45°		52°		56°.5		.....		.....		.....		.....		37°	
Monthly means	50°.7		34°.5		35°.1		31°.6		28°.1		34°		37°		57°		69°.6		72°.7		71°.4		69°.4	

* Maximum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

ESCANABA, MICH.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	48	70	52	68	52	71	44
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	39	71	50	66	47	73	57
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	56	48	70	53	70	39	64	42
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	47	72	54	72	45	65	42
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	49	73	49	64	48.5	63	51
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63	48	80	62	69	56	67	46
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	50	79	62	73	51	74	50
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	47	79	51	77	53	79	58
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	45	75	46	77	61	79	59
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*61	43	59	42	78	46	74	54	77	65
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	59	43	56	43	73	44	78	57	78	63
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	42	54	35	74	43	76	56	73	60
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60	38	59	40	80	54	70	50	69	57
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54	34	65	44	78	56	70	42	68	50
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54	40	59	51	79	60	70	48	57	43
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	39	64	49	71	47	72	51	61	38
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	57	35	71	50	75	55	79	62	65	55
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	58	32	66	53	74	53	72	50	67	55
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	35	76	59	92	59	73	62	66	46
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	58	40	78	59	69	46	74	53	57	43
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	56	37	78	58	75	47	65	53	64	39
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	57	34	83	60	78	54	65	50.5	65	52
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54	36	85	62	79	61	65	47.5	65	55
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60	40	73	57	78	59	68	41	69	52
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	44	83	54	73	64	71	48	69	53
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	40	78	58	70	59	72	54	66	56
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	46	73	56	71	46	74	54	60	47
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	46	88	59	73	48	74	63	65	44
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	46	72	56	74	46	72	61	62	42
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	49	67	45	69	61	67	54	52	40
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	49	.....	.....	88	54	70	46	.....	.....
Range	.....		.....		.....		.....		.....		.....		.....		.....		53°		46°		40°		41°	
Monthly means	41°.7		25°.5		25°.8		18°.2		17°.3		22°.8		29°.1		48°.9		60°.6		66°.9		64°.4		60°.1	

* Station supplied with maximum and minimum thermometers May 10, 1874.

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Maximum, minimum, and mean temperatures—Continued.

FORT BENTON, MONT.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	(*)	31	.....	30	.....	−20	.....	34	.....	2	.....	.....	.....	18	.....	45	.....	49	.....	52	.....	41	.....	47
2	.....	29	.....	25	.....	−20	.....	−11	.....	24	.....	0	.....	20	.....	43	.....	55	.....	57	.....	55	.....	38
3	.....	24	.....	37	.....	−20	.....	−21	.....	8	.....	− 3	.....	26	.....	39	.....	42	.....	55	.....	56	.....	40
4	.....	39	.....	29	.....	−29	.....	−23	.....	7	.....	−10	.....	27	.....	40	.....	42	.....	65	.....	54	.....	46
5	.....	27	.....	20	.....	−34	.....	20	.....	10	.....	3	.....	27	.....	45	.....	52	.....	45	.....	61	.....	44
6	.....	32	.....	40	.....	−24	.....	15	.....	10	.....	− 4	.....	23	.....	49	.....	52	.....	53	.....	56	.....	57
7	.....	37	.....	35	.....	−10	.....	40	.....	24	.....	1	.....	24	.....	59	.....	49	.....	51	.....	55	.....	50
8	.....	47	.....	38	.....	3	.....	26	.....	7	.....	− 6	.....	32	.....	45	.....	47	.....	50	.....	53	.....	42
9	.....	39	.....	45	.....	−20	.....	10	.....	21	.....	−15	.....	28	.....	45	.....	48	.....	53	.....	45	.....	47
10	.....	38	.....	31	.....	−16	.....	16	.....	22	.....	−21	.....	29	.....	39	.....	46	.....	52	.....	49	.....	47
11	.....	25	.....	26	.....	1	.....	0	.....	0	.....	−19	.....	35	.....	38	.....	47	.....	57	.....	54	.....	44
12	.....	38	.....	8	.....	2	.....	−17	.....	−11	.....	− 5	.....	37	.....	37	.....	51	.....	56	.....	43	.....	30
13	.....	36	.....	26	.....	− 4	.....	−23	.....	− 5	.....	16	.....	34	.....	46	.....	52	.....	64	.....	55	.....	39
14	.....	34	.....	35	.....	1	.....	−18	.....	−13	.....	14	.....	29	.....	43	.....	46	.....	55	.....	50	.....	27
15	.....	28	.....	36	.....	9	.....	0	.....	25	.....	12	.....	31	.....	36	.....	57	.....	49	.....	56	.....	41
16	.....	15	.....	42	.....	17	.....	3	.....	12	.....	17	.....	22	.....	46	.....	50	.....	52	.....	51	.....	47
17	.....	30	.....	31	.....	11	.....	−10	.....	25	.....	10	.....	31	.....	49	.....	53	.....	62	.....	54	.....	40
18	.....	14	.....	21	.....	3	.....	−13	.....	0	.....	6	.....	22	.....	50	.....	45	.....	62	.....	63	.....	35
19	.....	41	.....	26	.....	3	.....	−14	.....	− 5	.....	12	.....	26	.....	46	.....	40	.....	46	.....	53	.....	43
20	.....	33	.....	18	.....	− 1	.....	−26	.....	11	.....	24	.....	23	.....	58	.....	53	.....	52	.....	56	.....	32
21	.....	8	.....	22	.....	15	.....	−29	.....	0	.....	20	.....	17	.....	56	.....	52	.....	58	.....	62	.....	38
22	.....	9	.....	16	.....	20	.....	−23	.....	0	.....	17	.....	22	.....	54	.....	50	.....	56	.....	53	.....	34
23	.....	9	.....	23	.....	16	.....	−26	.....	−20	.....	19	.....	43	.....	59	.....	58	.....	67	.....	50	.....	41
24	.....	9	.....	38	.....	19	.....	− 5	.....	−22	.....	21	.....	41	.....	47	.....	53	.....	60	.....	61	.....	45
25	.....	− 3	.....	32	.....	30	.....	− 3	.....	6	.....	1	.....	36	.....	53	.....	53	.....	50	.....	61	.....	48
26	.....	30	.....	13	.....	16	.....	22	.....	7	.....	0	.....	37	.....	52	.....	48	.....	37	.....	55	.....	35
27	.....	39	.....	− 5	.....	10	.....	20	.....	10	.....	10	.....	40	.....	50	.....	56	.....	54	.....	69	.....	33
28	.....	32	.....	−14	.....	13	.....	1	.....	17	.....	4	.....	40	.....	39	.....	50	.....	52	.....	58	.....	45
29	.....	28	.....	− 4	.....	−15	.....	− 5	.....	.....	.....	9	.....	38	.....	37	.....	49	.....	62	.....	48	.....	46
30	.....	20	.....	− 8	.....	− 9	.....	− 3	.....	.....	.....	8	.....	50	.....	44	.....	44	.....	55	.....	49	.....	50
31	.....	18	.....	.....	.....	32	.....	− 9	.....	.....	.....	12	.....	.....	.....	43	.....	.....	.....	53	.....	49	.....	.....
Range																								
Monthly means	40°. 3		35°. 1		13°. 7		11°. 3		22°. 4		18°. 4		44°. 4		59°. 2		63°		75°. 1		69°. 1		58°. 2	

* No maximum thermometer at this station.

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Maximum, minimum, and mean temperatures—Continued.

FORT GARRY, MANITOBA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	39.5	19.5	31.6	21.3	14.7	0	25	2	17.2	−14.4	38.7	9.6	27.3	11.3	64.5	43.5	72.3	38.8	75	47.4	71.5	54.3	66	49.5
2	38.5	19	23	−10	3	− 7.3	31	11.7	12.3	4.6	11.2	− 5	21.5	− 5	52.8	35	71.5	50.2	80.3	53.4	76.5	45	63.5	41
3	41.5	16.5	31.5	−10.5	2	−18	12	−17	7.3	− 2.0	−11.4	20.2	20	−18	55.3	31.2	73	55	84	64.1	70.2	52.7	77	40.5
4	45	25	14.5	− 5	− 6	−13.8	−15.3	−26.7	8.5	− 7	11.4	−26	25.5	−16.5	61.5	36	68.3	47	85.3	65.4	72.8	60.5	78	46.1
5	36	21.8	24.5	− 3	− 5	−26	16.6	−23.2	15.6	−10.5	27.4	− 1	30	− 1	64.6	36.3	70.5	39	85.5	61.1	77.2	64.4	73	45
6	64	19.5	35.5	20	4	−17	19.5	− 1.5	14	7.3	14.4	− 5	26	− 3.5	64.3	35.4	66.3	43.5	86.2	57.4	85	65.7	80	48.5
7	74.3	35.4	21	9	23.5	0	32.0	11.0	24.2	− 1.4	2.2	− 5	28	5	76.5	41.8	75	52	82	55.4	84.9	51.5	87.5	55.5
8	76.5	39.3	23.7	−16.5	26.7	15	26.2	6.2	10.6	3	7.3	−19	32	− 7	94.5	52.2	53.6	42.3	85.1	57.4	86.9	55.1	88.5	52
9	63.3	42	32.2	19	17.3	− 7	3.3	− 9.6	16.3	−10.2	10.4	−13	37.4	− 7	73.5	49	69	30.5	77.5	57.1	89.2	57	57	65.5
10	50	31.5	31.6	15.3	11.2	− 9	3.0	− 6.5	4.3	− 9	7.8	−13.5	30	12	79	47	65.5	47.8	76.5	52	84.8	53.2	80	54.6
11	55.5	21	31.5	10.3	12.3	− 8	− 8	−16.3	22.4	0	2.6	−17.3	29.5	1.5	47.3	35	71	49.3	79.7	53.5	68.4	53.1	64.5	43.1
12	60	29.5	19.5	− 7.5	12.3	− 3	−12.6	−20	9.5	− 1.0	2	−25	44	18.5	50	32.3	71.8	42.3	84	64.6	69.5	54.3	70	37.5
13	55	32	18	− 1.5	18.4	− 7.3	−18.6	−29.3	− 1.5	−12	22	−17.4	41.3	33	61.4	26.2	76	48	79.3	57.6	77.4	46.1	71	45
14	53	28.2	35.2	8.5	25	3.5	−12.5	−30	− 1.5	−27.6	34	18.3	33	21.5	66	37	83.8	47.2	78	54.4	80	50.2	53	35.1
15	44	29.5	37.8	14.5	21.7	6.5	0	−14.2	9	−10.7	37.3	18.6	34.4	14.7	56.8	37	85.6	52.3	80	50.1	80	62.2	63.3	28.5
16	58	20.2	38.3	29	27.3	14	18.0	− 1.0	8.3	−17.3	38.6	31.8	46	25.5	53.4	33.7	85.5	53.2	79.6	53.4	(*)	(*)	60	44.7
17	46.5	36	29.2	8.3	24	0	21.4	− 3.5	26.3	− 3.6	40.2	21.5	35	14.5	60.2	27.5	91.2	57.4	87	53	.....	.....	57	46.5
18	42.5	32	7.5	− 5.5	17.6	4.5	− 3.5	−22.0	31.6	14.7	32	12.3	22.5	9	69.6	43.3	86.8	64.7	89.6	59.3	.....	.....	55	44
19	45.7	26	13.4	− 7.6	7	−18	− 3	−33	− 9	−17.3	27	5	32.5	9.3	59.6	36	83.5	52	69.8	52.1	.....	.....	53	37.1
20	60.5	30	23	5.7	3.3	−26.5	19.3	− 6.3	1	−16.1	19.5	3.6	38.5	20.3	66.8	30	88.3	48.5	84.7	49.6	.....	.....	54.3	37
21	51.8	32	20	0	17.2	−10	5.4	−20	− 7	−30	29	2.5	29.7	17	68	43.5	84.5	64	89.8	54.4	.....	.....	65.5	40.5
22	30.5	22	20.5	6.3	25.5	8	− 9.5	−27.4	0	−19.4	16.6	− 4.5	29.6	13.4	70.7	52	77.4	51.5	87	57.5	.....	.....	69.8	36.1
23	32	19	28.6	5.3	13.3	− 1	−14.4	−30	−10.4	−30.4	18	−15.2	42.6	17.6	70.7	50.7	83.3	55	82.5	50	77	51	69	47.1
24	31	17.3	29.3	14.5	15.3	− 5	−20.1	−36	− 4.4	−32.5	37.4	3.2	43	30	73.2	54	94	65	91.8	64	81.5	51.1	80.5	44.4
25	31	12.8	4.7	− 6.3	30.3	14.5	− 1.7	−38.7	6	−23	22	− 3	37	18	73	45.7	69.3	60	68	54	83.5	50.8	81	52.1
26	32.8	16.4	12	1.7	8.3	− 3	5.7	− 5.6	8.4	− 1.3	16	− 6.3	35.3	15.5	58.3	54.5	75.8	58.2	72	46	77.5	57.8	58.5	42.5
27	27.3	18.3	3.3	− 9.7	17.3	−10	1.3	− 2.4	4.3	−12.4	10.5	− 4	47.6	27.2	61.3	51	75	59.3	77.5	49.7	71	59.1	68.8	35.5
28	28.5	− 1	− 4.5	−21.3	21.4	2.4	− 1.5	− 7.3	27	−19.6	18.2	−12	54.6	29.3	63.2	46.3	64.9	51	75.2	53	69	64.1	67.0	33.1
29	35	24	− 5.3	−25.5	12.4	−11.3	− 5.4	−30.1	.....	.....	26.3	− 1.5	67	37.4	67.5	50	75	49.8	77.2	55.1	72	55.5	62.5	29.1
30	26	10	3.3	− 6.3	14.2	− 3.4	−12.4	−31.2	.....	.....	15	− 6.2	69.5	37.2	67.8	47	83.3	56.5	85.3	54.3	78	47.1	74.5	35.1
31	24.8	9.4	.....	.....	29	7.3	− 5.3	−28.5	.....	.....	30	− 1	.....	.....	61.5	43.3	.....	.....	73	51	76	60.9	.....	.....
Range	77°.5		63°.8		56°.3		70°.7		64°.1		66°.2		87°.5		68°.3		63°.5		45°.8		.....		60°	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

* Maximum and minimum not forwarded from station.

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Maximum, minimum, and mean temperatures—Continued.

FORT GIBSON, IND. T.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	67	51	63	28	68	62	59	36	32	27	54	42	48	32	80	61	90	67	83	69	98	74	98	65.5
2	75	48	57	45	69	62	64	40	30	23	72	41	60	31	80	59	83	67	90	67	88	70	98	74
3	81	55	63	36	80	23	76	60	50	22	78	43	70	33	57	51	91	68	92	67	98	70	89	64
4	83	56	65	48	29	14	69	12	55	33	64	37	76	50	59	46	91	69	92	67	101	77	89	59
5	86	54	64	43	43	24	39	11	50	37	59	51	46	38	68	40	92	70	85	69	105	80	91	61
6	57	40	67	34	38	30	43	19	45	26	67	42	58	36	75	40	92	67	91	71	105	75	93	73
7	67	34	68	46	53	37	51	20	52	23	55	29	48	41	83	45	94	69	96	71	106	75	82	73
8	72	45	70	44	58	47	54	20	56	35	64	35	47	42	80	58	90	70	98	75	104	74	81	70
9	80	53	72	38	48	37	55	30	51	31	64	48	51	36	78	60	90	73	88	73	105	75	82	69
10	82	58	78	37	65	50	59	31	57	26	60	38	65	30	70	58	87	69	90	71	105	83	84	71
11	80	56	67	38	70	55	48	33	65	41	52	36	73	43	77	60	83	62	89	69.5	104	82	86	71
12	75	42	45	30	67	31	42	31	69	47	59	30	70	42	78	56	78	58	90	65	104	76	91	69
13	76	48	60	23	41	25.5	42	23	47	26	60	36	75	51	82	56	85	58	94	73	103	76	91	69
14	77	53	67	28	48	20	28	14	57	29	51	43	75	51	85	60	91	63	94	71	101	72	87	64
15	78	55	72	49	55	31	31	13	61	46	51	43	54	33	80	61	84	64	89	69	96	79	73	53
16	77	62	68	48	66	41	42	22	58	38	66	46	46	41	76	64	85	64	91	69	97	75	77	54
17	68	65	77	36	55	31	44	29	43	33	73	54	54	36	86	52	87	61	92.5	72	101	75	86	62
18	60	45	43	30	53	29	60	39	53	37	73	50	56	44	84	53	91	66	94	71	95	74	91	66
19	62	33	43	22	43	27	55	26	55	36	55	39	56	48	80	53	91	65	96	71	94	71	74	52
20	68	35	58	30	39	22	54	22	50	36	64	38	53	43	89	66	93	65	97	73	96	72	77	49
21	74	42	62	35	43	30	65	48	45	34	71	52	60	41	88	61	92	70	100	76	94	72	67	53
22	58	38	64	53	39	25	58	31	36	28	63	41	52	41	89	62	92	71	98	74	101	72	72	57
23	53	26	53	39	39	33	43	24	38	20	63	47	55	41	91	64	90	69	101	79	90.5	72	67	62
24	60	33	55	35	40	35	42	29	44	24	57	34	62	35	91	65	89	72	102.5	75	97	67	80	61
25	61	45	52	36	38	29	49	24	36	18	67	41	68	40	94	68	90	73	104	81	100	75	82	63
26	56	36	68	39	48	28	44	39	53	21	69	48	82	46	92	66	93	75	102	78	99	73	82	62
27	59	20	45	27	33	23	59	40	57	34	48	36	77	46	90	68	93	75	96	73	97	79	78	43
28	39	20	44	26	48	19	51	30	51	45	58	31	60	46	79	67	93	74	96	92	100.5	79	76	45
29	59	18	54	28	44	27	62	32	.....	.....	68	47	70	38	81	67	85	70	91	64	100.5	73	84	45
30	64	28	68	44	42	15	43	29	.....	.....	58	52	79	54	89	68	89	69	93	66	93	71	87	51
31	45	24	.....	.....	52	28	42	30	.....	.....	51	34	.....	.....	91	67	.....	.....	99	67	91	66	.....	.....
Range	68°		56°		66°		65°		51°		42°		52°		54°		26°		40°		40°		55°	
Monthly means	56°.9		49°.8		40°.6		39°.5		41°.3		52°.2		53°		70°.3		78°.6		83°.1		86°.1		71°.5	

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Maximum, minimum, and mean temperatures—Continued.

FORT SULLY, DAK.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	67	28	53	17	19	13	47	23	30	11	65	27	54	28	73	55	62	57	90	59	91	57	82	65
2	56	31	46	33	13	− 1	50	30	32	10	52	33	55	18	57	34	67	57	80	70	96	63	65	52
3	53	35.5	72	28	3	− 9	30	−12	28	7	39	7	31	22	51	38	90	52	106	79	92	55	70	39
4	77	35.5	49	22	− 2	−20	16	−16	22	− 5	26	4	25	16	57	41	77	52	101	72	103	69	74	49
5	52	36	48	21	4	−27	40	13	30	16	39	7	51	16	70	42	79	52	105	71	91	67	94	55
6	76	26	58	21	18	− 2	40	25	32	10	33	17	45	23	71	43	74	56	91	67	95	67	101	55
7	81	40	59	21	25	8	47	1	36	16	24	5	56	26	90	55	84	58	93	67	94	60	107	69
8	76	42	64	29	27	9	45	30	32	10	25	6	49	26	96	59	68	56	99	70	92	64	95	72
9	74	49	61	31	12	0	45	24	36	0	27	12	63	32	82	59	67	52	97	66	96	70	83	70
10	66	47	60	30	30	8	38	16	24	11	26	2	75	33	60	39	58	39	91	57	92	70	82	51
11	68.5	38.5	45	33	25	3	19	10	35	8	28	7	58	23	46	35	70	42	91	64	86	59	75	55
12	78	43	46	20	25	− 3	25	− 3	18	7	31	1	78	39	55	40	83	50	96	67	80	55	81	38
13	65	47	43	17	38	21	0	−11	19	3	43	18	67	43	52	38	76	56	98	63	94	57	77	49
14	61.5	35	67	21	27	8	2	−14	10	− 3	57	34	51	36	59	47	64	57	94	67	99	63	65	39
15	56	40.5	61	43	23	2	13	− 7	41	− 1	64	29	55	22	70	43	79	56	86	55	102	68	82	41
16	50	41	56	40	30	5	33	3	34	14	60	43	63	25	71	50	97	63	93	73	93	64	74	55
17	50	38	61	33	23	6	50	24	56	25	44	32	61	35	73	46	98	65	94	60	78	57	65	42
18	47	35	33	18	25	12	40	− 3	43	33	34	25	42	25	80	46	87	67	100	74	97	60	60	50
19	61	40	42	15	25	0	20	−13	34	9	48	13	64	22	76	50	87	63	81	61	91	66	68	46
20	73	39	47	24	12	−19	35	7	43	7	42	28	47	28	78	48	101	67	71	59	100	66	71	45
21	56	29	41	20	19	− 3	14	− 1	14	− 7	49	23	51	31	82	60	105	74	89	64	82	61	76	43
22	36	20	43	23	29	3	5	−10	22	6	40	20	45	26	91	63	111	75	102	67	94	63	83	46
23	39	14	49	26	41	16	12	− 6	8	− 9	38	10	60	23	98	62	97	73	97	65	88	59	91	45
24	28	16	50	30	30	10	20	− 5	18	−10.5	65	18	63	42	77	62	99	75	101	73	85	58	91	50
25	28	22	38	23	44	21	22	− 6	32	− 4	49	20	60	32	93	53	100	69	85	62	91	59	85	54
26	41	11	46	16	32	8	48	6	41	14	20	4	49	37	101	74	100	77	78	52	93	68	72	47
27	36	19	21	8	32	4	38	15	54	22	31.5	11	64	39	99	66	80	57	87	61	93	63	60	51
28	40	11	29	1	33	14	44	8	58	22	34	19	81	33	96	62	76	55	97	59	86	65	66	45
29	52	38	25	4	27	4	43	− 7	.....	.....	53	12	89	58	69	60	86	61	99	66	89	62	72	52
30	44	16	22	12	23	1	5	−13	.....	.....	38	17	93	49	74	61	80	60	106	65	95	57	67	44
31	37	5	.....	.....	46	13	15	− 8	.....	.....	49	13	.....	.....	82	54	.....	.....	88	69	103	72	.....	.....
Range	76°		71°		73°		66°		68°.5		64°		77°		67°		72°		54°		48°		60°.	
Monthly means	42°.1		35°.1		14°.9		16°.1		20°.3		27°.7		43°.9		63°.2		70°.2		79°.2		76°.1		65°.2	

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Maximum, minimum, and mean temperatures—Continued.

GALVESTON, TEX.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																	88	73	93	81	91	80	91	80
2																	86	74	96	75	91	81	90	79
3																	87	76	91	77	91	79	88	76
4																	87	76	89	74	94	80	83	74
5																	87	76	89	74	94.5	80	84	75
6																	87	76	88	80	92	80	87	76
7																	88	77	92	80	92	80	88	79
8																	88	78	90	79	94	81	88	81
9																	86	78	90	80	93	82	88	80
10															*80	71	88	78	88	81	92	82	87	80
11															81	72	90	78	87	76	93	82	86	74
12															82	71	91	78	90	74	93.5	82	87	77
13															82	68	91	77	90	79	94	83	86	78
14															81	69	91	80	87	78	98.5	80	86	77
15															82	69	91	80	82	76	96	79.5	83	74
16															85	71	90	78	84	72	92	79	85	73
17															84	70	89	77	87	72	92	80	87	76
18															85	70	83	78	89	77	89	78	88	80
19															85	71	84	78	90	78	87	74	82	73
20															83	71	89	77	90	78	83	75	85	73
21															84	71	92	76	91	80	89	77	83	73
22															85	72	90	77	90	79	92	82	84	78
23															88	73	84	76	90	79	85	79	84	72
24															86	74	87	78	90	81	84	74	83	74
25															87	74	90	79	90	80	90	80	80	75
26															86	76	90	80	90	81	91	79	84	75
27															78	74	89	80	90	78	91	81	85	73
28															83	75	90	79	95	76	90	80	75	70
29															85	75	92	80	89	81	90	81	75	66
30															87	77	93	81	93	81	93	79	77	66
31															89	73			92	80	92	81		
Range																	20°		23°		24°.5		25°	
Monthly means	70°		62°.6		58°		55°		59°		6.°0		66°		75°		81°.7		82°.5		84°.4		79°.5	

*Station supplied with maximum and minimum thermometers May 10, 1874.

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Maximum, minimum, and mean temperatures—Continued.

GENEVA, N. Y., (HOBART COLLEGE OBSERVATORY.)

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	65	35	49	35	28	8	42	30	.....	.....	52	20	53	20	.....	.....	85	42	.....	.....	.....	.....	.....	.....
2	57	34	54	25	40	18	43	36	.....	.....	53	38	51	20	.....	.....	86	41	.....	.....	.....	.....	.....	.....
3	58	35	50	25	49	28	51	37	.....	.....	53	35	50	10	50	34	85	35	.....	.....	.....	.....	.....	.....
4	68	45	56	25	62	30	67	25	.....	.....	53	23	.....	.....	46	42	90	50	.....	.....	.....	.....	.....	.....
5	.....	.....	56	25	35	23	30	22	.....	.....	30	11	47	25	65	31	85	63	.....	.....	.....	.....	.....	.....
6	.....	.....	47	25	33	19	40	24	.....	.....	44	30	49	25	50	33	87	64	.....	.....	.....	.....	.....	.....
7	.....	.....	48	23	38	17	43	38	.....	.....	42	35	50	30	45	29	86	59	.....	.....	.....	.....	.....	.....
8	.....	.....	50	31	40	28	43	33	26	— 5	37	30	50	25	62	36	90	64	.....	.....	.....	.....	.....	.....
9	.....	.....	48	27	50	37	43	30	34	0	30	12	48	32	84	43	85	54	.....	.....	.....	.....	.....	.....
10	.....	.....	46	24	49	34	43	26	27	13	25	15	47	12	.....	.....	89	53	.....	.....	.....	.....	.....	.....
11	.....	.....	42	27	51	30	40	34	35	17	25	17	49	12	.....	.....	86	59	.....	.....	.....	.....	.....	.....
12	53	40	46	28	50	28	43	20	45	24	25	5	49	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	54	47	36	20	39	20	33	17	35	0	20	7	50	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	64	43	32	18	40	18	32	6	32	18	31	17	45	15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	64	36	40	22	39	19	46	3	40	20	40	15	60	37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	75	47	42	22	46	26	20	5	40	20	45	27	43	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	60	41	34	26	46	30	30	5	25	8	50	40	35	30	85	45	.....	.....	.....	.....	.....	.....	.....	.....
18	62	51	42	27	48	22	37	21	35	10	62	47	49	32	90	47	.....	.....	.....	.....	.....	.....	.....	.....
19	50	40	42	26	39	29	40	24	38	10	60	39	49	32	59	40	.....	.....	.....	.....	.....	.....	.....	.....
20	43	35	46	18	40	24	26	14	40	32	50	20	58	35	52	40	.....	.....	.....	.....	.....	.....	.....	.....
21	51	41	32	18	33	23	41	21	43	28	50	25	47	30	49	41	.....	.....	.....	.....	.....	.....	.....	.....
22	60	43	39	26	53	14	53	40	43	28	50	25	54	31	62	47	.....	.....	.....	.....	.....	.....	.....	.....
23	66	42	40	25	29	10	60	24	57	28	40	20	49	29	60	49	.....	.....	.....	.....	.....	.....	.....	.....
24	53	34	40	25	23	10	37	7	50	28	40	20	40	25	70	50	.....	.....	.....	.....	.....	.....	.....	.....
25	51	31	40	15	35	20	(*)	.....	(*)	.....	31	19	39	21	74	53	.....	.....	.....	.....	.....	.....	.....	.....
26	53	31	25	7	38	25	15	— 9	30	15	55	25	.....	.....	73	50	.....	.....	.....	.....	.....	.....	.....	.....
27	57	40	38	18	37	24	37	10	43	18	50	37	.....	.....	79	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	48	32	34	16	37	18	(*)	.....	41	20	40	34	.....	.....	87	45	.....	.....	.....	.....	.....	.....	.....	.....
29	41	37	34	16	37	11	(*)	.....	.....	.....	39	19	.....	.....	85	51	.....	.....	.....	.....	.....	.....	.....	.....
30	46	37	39	10	38	11	28	9	.....	.....	42	18	.....	.....	89	52	.....	.....	.....	.....	.....	.....	.....	.....
31	50	28	.....	.....	35	20	(*)	.....	.....	.....	37	20	.....	.....	88	58	.....	.....	.....	.....	.....	.....	.....	.....
Range	...	...	49°		54°		.....		.....		57°		.....		.....		.....		.....		.....		.....	
Monthly means	...	...	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

* Observer sick.

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Maximum, minimum, and mean temperatures—Continued.

GRAND HAVEN, MICH.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	58	36	44	34	32	23	44	37	22	6	41	36	37	17	52	35	61	47	77	64	77	64	.....	.....
2	61	32	47	38	55	32	45	39	20	10	47	36	40	30	56	40	68	46	71	59	68	58	.....	.....
3	53	42	42	33	58	48	56	44	32	6	44	31	32	18	59	36	70	55	81	55	66	51	.....	.....
4	56	48	51	35	38	19	54	25	36	28	31	20	26	9	57	45	82	52	82	69	71	53	.....	.....
5	56	42	37	27	27	19	31	22	29	18	43	22	30	21	55	40	70	56	82	58	65	56	.....	.....
6	45	33	44	22	28	16	30	18	24	19	40	34	40	30	50	41	75	56	81	66	75	58	.....	.....
7	55	28	53	36	36	24	35	22	31	16	39	31	38	28	60	37	70	54	85	66	75	61	.....	.....
8	58	37	45	35	47	32	40	28	35	21	31	22	45	26	70	47	77	54	80	68	71	60	.....	.....
9	71	37	40	34	43	33	41	32	28	23	30	22	40	16	72	55	72	55	78	68	78	61	81	64
10	68	55	39	31	38	33	36	30	33	17	28	17	45	26	75	54	67	52	81	59	76	63	80	63
11	59	45	37	31	46	34	31	23	31	4	25	17	36	25	76	56	67	52	75	57	91	66	78	59
12	49	36	31	24	37	33	29	20	51	25	24	16	44	21	66	56	55	45	73	52	83	69	80	62
13	59	32	32	24	33	29	27	24	44	28	26	18	69	32	58	47	67	41	81	50	75	64	76	65
14	59	40	37	23	39	32	25	11	37	23	36	15	57	43	68	45	78	54	89	63	70	56	82	64
15	68	43	46	35	40	34	13	10	41	35	49	31	38	29	62	46	68	57	79	65	74	56	69	51
16	60	55	45	37	41	37	25	13	36	18	53	34	41	25	52	42	67	54	67	55	78	54	63	43
17	67	50	44	36	43	35	34	16	28	18	57	38	46	30	52	39	72	54	77	52	78	67	70	47
18	53	47	37	26	36	32	37	30	35	16	52	35	51	27	52	36	74	57	84	60	78	61	74	58
19	50	35	26	21	35	26	29	25	38	33	44	33	52	35	54	38	80	59	83	68	85	59	70	56
20	46	30	30	22	25	21	33	21	37	28	42	31	46	34	52	43	81	61	71	61	79	59	60	52
21	41	38	40	23	35	21	42	33	39	27	42	33	45	34	57	45	83	60	77	52	81	63	64	43
22	56	38	42	29	34	24	41	29	37	30	43	29	46	34	65	39	83	62	77	55	75	59	65	52
23	42	33	35	29	41	21	30	24	33	23	29	17	41	26	71	54	83	69	82	58	(*)	(*)	68	51
24	50	41	39	26	39	28	26	14	24	17	33	19	43	23	76	58	84	68	86	71	.....	.....	70	57
25	46	38	31	27	39	31	20	12	25	14	39	33	51	30	59	49	80	66	85	68	.....	.....	76	54
26	46	37	32	26	38	32	38	14	32	14	40	27	42	34	57	43	81	66	78	64	.....	.....	72	60
27	43	34	33	26	34	29	39	34	33	26	37	23	50	34	82	43	88	63	74	55	.....	.....	63	56
28	38	30	30	23	36	29	34	26	39	26	31	25	47	34	82	66	84	68	73	56	.....	.....	59	52
29	36	28	32	19	35	20	32	20	.....	.....	36	22	42	28	79	61	72	62	73	58	.....	.....	62	48
30	41	30	28	20	36	21	20	11	.....	.....	40	29	50	37	81	63	75	55	76	61	.....	.....	56	42
31	40	30	.....	.....	39	33	20	6	.....	.....	31	21	.....	.....	73	57	.....	.....	80	63	.....	.....	.....	.....
Range	43°		32°		42°		50°		47°		42°		60°		47°		47°		39°		.....		.....	
Monthly means	46°.9		33°.3		34°		28°.4		27°.6		32°.2		36°.3		56°.6		65°.9		70°.4		68°.4		63°.9	

* Maximum and minimum thermometers broken.

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Maximum, minimum, and mean temperatures—Continued.

HALIFAX, NOVA SCOTIA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	58.9	37	59.2	37.6	15.4	3.9	41.1	25	16	− 6.3	29.9	− 9	34.9	7.2	49.5	32.2	57	50.5	68	47.8	76	55.1	75.3	52.8
2	65.2	37.3	53.8	34.2	23	5	41.2	32.5	7.1	−11.3	45.3	22.8	29.8	18	55	30	57.8	38	61	47.2	74.5	60	71	51.1
3	58.6	35	56.4	38.9	47	18.8	41.2	33.6	30	− 9.9	50.4	28.8	35	27.2	45.2	33.5	68.8	36.5	54	43.3	78.8	54	76	55
4	58	35	45	28.5	53.9	39.1	47.2	33.3	33.1	19.7	47.9	37.8	38.9	16.2	65.3	38.3	64	43.5	60.9	47.1	67	49	69	48.1
5	60	46	56.9	26.4	53.9	33	47.8	33.1	22.9	4	45.1	27.3	35.3	8.9	56.3	30.5	54	47	54.2	48.8	73	47.5	74.8	45.7
6	70.8	51.3	33.5	21.8	34.1	16.2	33.7	21.6	10.3	− 3.3	28	19.3	41	25.2	61.8	34.5	63.8	46.8	70.6	47.9	57.8	53	67.5	46.4
7	66	50.1	37.6	18.2	29.5	12.8	48.8	28.8	19.5	− 8	39.7	18.6	40.2	28.2	52.7	31	60.6	46	69.9	50.5	77	51.3	65.7	59.7
8	61	47.3	56.2	24.9	27.2	16.4	51	40.6	22.8	−11.5	36.7	31.2	37.8	25	53.1	32	61.3	45	73.8	49.8	77.1	51.3	71.1	54.8
9	56.8	41.4	42.8	38.9	43.3	18.3	51	37.9	33.6	8.4	34	27.3	39	30.4	59.3	33	58.8	41.8	83.8	53.9	70.5	56.8	73.6	50.2
10	63.9	38.4	34.3	29.3	40.3	13.9	42	32.9	35	13.5	32	27.1	33.5	27.2	58.3	36.1	62.4	39.8	86	52.2	65.2	56.5	79.8	50.4
11	51	42.1	28	26.8	26	10.3	37	33	30	19.9	42	30	41.5	25.5	57.9	35	68	43.5	80.8	57	85.7	57	65	43.9
12	60.1	53.9	51	39	39.2	23	29.8	26.8	29.8	9.8	28.9	22.3	35.1	18.9	68.7	35.9	51.5	44.5	82.8	60	82	57.8	61.3	46.1
13	65.7	41.3	43.8	37.4	32.8	34	22.8	15.9	38.3	1.5	26.6	22	37.5	13.5	73.6	42	73.8	45.3	74	56	81.2	59	69.6	42
14	53.9	36.6	31.1	24.8	31.1	15.8	39	27	46.2	33	40.6	32.7	46	20.1	81.6	43.5	70.1	46.3	78.1	59.9	63.4	58	76	41
15	57.1	40.1	25	22.7	17.8	− 1.3	22.2	14.8	34.7	25	46.1	26	53.8	31.2	69.8	39	79.2	44.9	85.5	58.8	66.7	56	74.9	49.9
16	58.2	33.3	31.1	21.7	39.1	− 2.9	13.7	9	34.5	24.9	48.8	25.6	53	34.9	59	35.5	64.8	43.9	83.3	58.3	79.7	50	71.9	51
17	53	37.9	38.9	24.1	42.2	33.3	15.2	10.2	39.6	23	52.2	24.9	46.5	28.5	63	40.9	58.5	48.4	72.7	57	78.8	48	65.1	52.2
18	55.5	29.8	54	31.6	39.3	33.3	35.4	8.2	27	14.5	41.5	26	49.9	28.1	59.4	46.5	54	49.9	75.9	55.1	73.7	52	59.8	49.2
19	68.4	38.7	46.2	36.1	37.2	27.5	49.7	27	34	8.6	46.4	37.3	44.7	27.1	51.2	43.5	51.9	48.2	81	49.1	78.9	53	57.7	49.4
20	63.3	45	36.6	26	34.5	26.1	43.2	10	42.6	29.3	50.5	26	51	31	58.3	41.5	55.6	45.5	72.2	51.3	66.2	49.8	63.1	55.9
21	53.8	51.1	32.7	21.7	28.7	11.7	27.1	6.3	38	29.5	41	21.1	37.5	28.6	72.8	40.6	60	48.3	73	55.9	82.2	55.3	69.4	58.8
22	55.3	51.4	45.3	25.3	25	3.8	38	27.1	38	26.2	42.2	25.4	42.8	26.9	56	42.5	74.3	50.3	82.8	57.3	74.9	51.9	69.4	47.6
23	66.4	41.4	31.3	20.2	24	2.3	45.2	33.9	32	22	30.8	19	50.3	25.8	62.5	42	73.8	53.1	76.9	52.2	74.9	45.1	64.5	41
24	65.3	37.8	32.8	15.2	29.6	8	43.1	20.1	34.5	15	29.7	10	49.5	32.7	69.5	36	71.8	47	82.2	51.1	73.5	45.1	71.1	40
25	60.2	37	42.1	31.7	32.6	13.2	26.5	13.7	25.6	9.3	32.2	7.3	51.9	28.6	53.3	36	65	42.5	83.8	50	73.1	43.6	69.1	43.2
26	52	31.5	33.3	23	22.9	− 0.3	14.2	−14.8	19	− 1	54.5	31.4	35.2	32	56.3	45	73.8	46	79	49	71.5	51.5	70.6	43.8
27	59.2	39.4	30.8	15	28.6	19.2	24.9	−15.8	37.2	− 5	44.5	24	39.5	31	74.3	44.5	78.9	44	77.8	52.5	71.8	47.5	70.3	43.4
28	60	51.1	43.7	24	44	20	44.6	24.9	24.5	1	32	20.3	53.8	29.9	74.3	47.5	78.8	55.4	79	60.4	72.9	48	64.9	54.6
29	56.3	40	24.5	16.2	37.3	23.8	42.1	16.4	.....	.....	41.8	17.1	44.6	31.9	64.5	45.5	62	49.9	85.2	60.5	71.3	55.2	69.8	58.0
30	52.2	34	21.2	6.8	39.5	20.1	28.3	− 1.9	.....	.....	33.8	16.2	45.5	32	71	39.5	55	46.4	69	61.5	67.9	56.1	72.9	54.6
31	57	36.5	.....	.....	29.3	13.8	14.2	− 7.2	.....	.....	42.8	16.1	.....	.....	68.7	46	.....	.....	83	55.8	70	52	.....	.....
Range	41°		52°.4		56°.8		66°.8		57°.7		63°.5		46°.6		51°.6		42°.7		42°.7		42°.1		36°	
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

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Maximum, minimum, and mean temperatures—Continued.

INDIANAPOLIS, IND.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	58	85	64	84	69	84	59
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	58	84	66	81	59	83	60
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	65	88	61	80	57	82	64
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	66	96	70	82	56	82	63
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	68	91	73	82	62	75	62
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	69	95	70	85	69	83	56
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	72	97	74	85	72	88	61
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*80	54	94	76	91	76	83	64	88	64
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	81	61	92	73	93	73	90	65	90	62
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	61	89	67	86	70	88	66	88	64
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	61	84	62	77	66	95	74	86	57
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	87	61	68	56	83	62	93	77	87	59
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	81	60	75	50	89	66	92	69	90	60
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	82	56	72	62	92	71	92	66	86	66
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	81	60	71	68	78	72	82	60	76	60
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	54	78	62	78	64	87	59.8	67	54
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	52	82	60	81	56	89	61	72	58
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	42	87	65	89	60	92	68	83	61
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	40	90	66	91	72	92	68	75	57
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	51	90	67	83	75	92	68	68	47
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	44	92	66	78	67	88	73	68	42
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	42	91	61	83	62	78	70	74	44
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69	58	93	70	89	68	78	68	78	42
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	54	95	75	95	71	78	59	79	55
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	67	88	68	91	71	81	60	81	66
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	56	90	67	95	77	82	61	74	66
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	87	56	94	72	79	67	80	62	71	55
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	64	96	73	77	60	74	64	64	52
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	64	82	70	81	58	75	65	71	41
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	87	70	83	64	84	60	80	61	64	46
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	68	.....	.....	87	66	81	63	.....	.....
Range	.....		.....		.....		.....		.....		.....		.....		.....		46°		39°		39°		49°	
Monthly means	51°		37°.5		37°.6		33°.6		36°		42°.2		45°.6		66°.2		77°.4		78°.5		75°.9		69°.6	

* Station supplied with maximum and minimum thermometers May 8, 1874.

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Maximum, minimum, and mean temperatures—Continued.

INDIANOLA, TEXAS.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	79.5	71	72.5	61.5	76	63.5	71	52.5	52	39.5	75.5	65	64.5	41	79	65	91	70	90.5	76.5	93	78.5	88.5	79
2	81.5	73.5	76.5	63.5	76.5	66	74	(†)	50.5	36	75	62	66.5	49.5	78.5	69.5	88	72	93.5	73	94	78.5	87.5	77.5
3	(*)	.....	64.5	62	76	57.5	74.5	.....	54.5	45.5	76	67.5	72	51	81	71	88.5	73	90.5	71	94	78	88	71
4	.....	.....	67	59	58.5	47	66	.....	57	52.5	72	67	76.5	60	75	56	89	73	87.5	71	94	78.5	80	70
5	.....	.....	65.5	60	59	52	45	.....	69.5	56	75.5	68	83	69	77	56	89	74	88	74	95	77.5	75	70
6	78.5	65	70	58.5	76.5	59	51	.....	57.5	48	80	68	81	71	75.5	61	88	75	90.5	78.5	92.5	77	83	76
7	68	55	74	55.5	78.5	65	52	....	60	42.5	70	56.5	79.5	72	77	60	90	76.5	90	78	93	78	87	72.5
8	77	61.5	77	58	77.5	66	64.5	.....	63.5	43	65.5	60.5	73	52	78	64	89	77	93	76.5	90.5	78.5	87.5	78
9	85	68.5	75	60	72.5	66	64.5	.....	60	46.5	71	64	62	48	81	68	89.5	77.5	92	77.5	95	79	87	78
10	81	72.5	71.5	59.5	69.5	66	69	.....	64.5	51	78	66	67	49	81.5	70	90	77	91	78.5	95	79.5	88	75.5
11	80	70	75	59	78	66	74	.....	70.5	58	70	45	69	53.5	82	71	89.5	78	95.5	76.5	94	79	88.5	76.5
12	84.5	70	65.5	53.5	77	54	74.5	.....	71.5	61.5	59	50	75.5	62	77.5	71	90	75	92	77.5	88.5	80	85	74.5
13	80	71.5	62	48.5	56.5	44	73.5	.....	71.5	62	63.5	57	79	67.5	81.5	68	87.5	76.5	91.5	77	93	80	84.5	76.5
14	85.5	75.5	75	55.5	54.5	46	64	.....	63.5	55.5	69	59	81.5	68.5	82.5	68	91	76	92.5	77.5	97.5	76.5	87.5	74.5
15	82	73.5	77	68.5	58.5	47.5	43.5	.....	73.5	61	76	59	81	68	86	68	92.4	77	93	73	100	76	79	73.5
16	82	73.5	80.5	66	64	55.5	42	.....	74	64	79	67	74	58	83.5	66	87.5	77	80	71	91	74	82	69.5
17	85	74.5	74	52	77	62	51	.....	70	59.5	79	66	69	56	81	68	86	76	84	72	91	74.5	89.5	74.5
18	77	66.5	67.5	54.5	75	63.5	68.5	.....	65.5	48	78	68.5	71.5	55	87.5	67.5	86	72	83	75	88.5	73	88	79
19	70	54.5	56	42.5	64	53	73.5	.....	73.5	61.5	77	71	74	53	89	66	86.5	78	86	74	87.5	76	83	69
20	75.5	51	70.5	48.5	59	49.5	73.5	.....	75.5	65.5	76	60	81	61	90.5	70	90	73	86	74	82.5	73	82	71
21	78	57	71.5	59.5	62	50.5	73	.....	70.5	59.5	78.5	68	76	66	88	69	89.5	78	86	77.5	88	78.5	81	70
22	82.5	54	78	67.5	56.5	43	74.5	.....	73.5	48	76	63	80	66.5	89.5	70	82	75	85	76.5	88	80	86	70
23	60.5	46	79	61.5	48.5	42	61	.....	53	39.5	70.5	56	70	50	88	71	84.5	72	91	77.5	87.5	78	86	71
24	66.5	53.5	61.5	51	49.5	40.5	61	.....	53	45	62.5	49	59.5	50	87	73	81	70	92	77.5	88	73	82	68.5
25	81	63	60.5	52	54	41.5	53.5	.....	58.5	44	63	57.5	74	54	83.5	73.5	88	70	91	79	92	78	80	72
26	81	72.5	58.5	55	62.5	42.5	61.5	51	60.5	54	71	60	78.5	60	83	72	88	76	90	78.5	92.5	78	86	73.5
27	74.5	52.5	70.5	51.5	56.5	40.5	63.5	51.5	75.5	55.5	77.5	64.5	78	63.5	88	71	88.5	76.5	93.5	77	93	78	85	74
28	59.5	49.5	60.5	48.5	62	45	62	52.5	76.5	65	79	68	78	64.5	86.5	75.5	88	76	97.5	73.5	93	77.5	80.5	66
29	59	46	63.5	47.5	71	55	63.5	47	.....	.....	80.5	68.5	69	60	82	72	91	76	93	74	93.5	78	78	65
30	64.5	54.5	75.5	60	59.5	44	63.5	52	.....	.....	80	70	76	58.5	86	75	90	76	93.5	78	97	79	78.5	66
31	66.5	58.5	.....	.....	59.5	47.5	67.5	60	.....	.....	81.5	64.5	.....	.....	86	72	.....	.....	94	78	95	78.5	.....	.....
Range	.....	.....	38°		38°		.....	.....	40°.5		31°.5		42°		34°.5		22°.4		26°.5		27°		24°.5	
Monthly means	70°.1		63°		58°.3		55°.5		58°.4		67°.3		66°.1		74° 9		81°.2		82°.3		84°.3		79°.2	

* Observer sick.

† Minimum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

ISLAND OF SAINT PAUL, BEHRING SEA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	45	41	38	33	40	36	35	18	36	33	37	35	38	32	37	25	41	35	50	44	.....	.....	.....	.....
2	46	41	41	37	40	34	37	32	35	31	36	31	39	34	38	33	42	34	48	44	.....	.....	.....	.....
3	45	39	40	38	34	30	34	30	33	29	33	30	40	33	38	31	44	35	54	43	.....	.....	.....	.....
4	43	39	39	35	38	30	34	31	34	25	30	23	42	33	38	34	49	36	49	45	.....	.....	.....	.....
5	41	38	40	36	37	30	31	27	34	32	28	21	41	34	45	35	52	39	.....	.....	.....	.....	.....	.....
6	44	34	37	34	40	37	27	8	37	31	39	27	43	34	42	36	51	42	.....	.....	.....	.....	.....	.....
7	37	34	35	29	37	31	22	10	36	34	42	35	45	35	41	33	48	42	.....	.....	.....	.....	.....	.....
8	36	33	29	25	38	29	19	13	36	27	40	35	41	35	40	35	49	42	.....	.....	.....	.....	.....	.....
9	35	31	30	23	37	28	28	13	40	36	39	34	36	33	37	33	48	38	.....	.....	.....	.....	.....	.....
10	40	32	30	24	31	22	34	28	40	36	37	32	41	34	43	32	48	40	.....	.....	.....	.....	.....	.....
11	43	36	34	23	30	21	36	32	38	34	36	33	37	30	42	36	47	41	.....	.....	.....	.....	.....	.....
12	43	41	32	28	30	20	36	32	39	34	38	32	30	24	39	36	57	42	.....	.....	.....	.....	.....	.....
13	42	36	34	29	34	18	32	24	34	32	37	33	28	21	46	36	54	44	.....	.....	.....	.....	.....	.....
14	39	34	34	31	24	17	33	27	32	25	36	34	36	25	45	37	51	44	.....	.....	.....	.....	.....	.....
15	42	33	32	27	22	13	35	32	32	22	38	30	32	24	52	38	46	44	.....	.....	.....	.....	.....	.....
16	41	37	30	27	30	19	35	33	37	32	33	27	31	30	47	35	51	42	.....	.....	.....	.....	.....	.....
17	37	35	30	27	34	30	36	33	36	31	37	31	34	28	39	35	47	42	.....	.....	.....	.....	.....	.....
18	36	34	31	29	34	33	36	34	34	23	40	37	31	28	44	35	46	41	.....	.....	.....	.....	.....	.....
19	39	33	31	27	34	33	36	34	31	24	37	32	34	26	45	34	47	42	.....	.....	.....	.....	.....	.....
20	41	38	28	25	33	29	36	34	34	19	32	25	39	33	48	37	54	42	.....	.....	.....	.....	.....	.....
21	41	39	28	24	29	26	35	34	38	33	35	19	38	34	45	33	46	41	.....	.....	.....	.....	.....	.....
22	40	38	31	25	32	21	36	32	38	34	37	31	41	34	47	33	48	42	.....	.....	.....	.....	.....	.....
23	39	38	34	30	39	32	34	32	39	36	35	31	41	34	46	33	49	42	.....	.....	.....	.....	.....	.....
24	38	35	37	34	39	33	33	24	38	28	32	29	40	36	45	36	46	43	.....	.....	.....	.....	.....	.....
25	38	33	37	36	35	32	30	14	28	23	30	28	41	36	46	37	46	42	.....	.....	.....	.....	.....	.....
26	37	34	36	35	39	32	31	12	33	23	38	30	43	37	48	37	48	43	.....	.....	.....	.....	.....	.....
27	35	33	39	35	39	31	32	30	37	32	38	33	42	36	48	39	48	42	.....	.....	.....	.....	.....	.....
28	38	34	38	33	32	24	34	31	36	31	37	32	39	34	49	39	46	42	.....	.....	.....	.....	.....	.....
29	41	34	39	36	29	20	35	33	.....	.....	35	31	35	29	43	40	46	42	.....	.....	.....	.....	.....	.....
30	39	35	38	36	33	14	34	32	.....	.....	32	29	31	36	45	37	50	41	.....	.....	.....	.....	.....	.....
31	38	36	.....	.....	18	12	36	31	.....	.....	34	28	.....	.....	44	37	.....	.....	.....	.....	.....	.....	.....	.....
Range	15°		18°		28°		29°		21°		23°		24°		27°		23°		.....		.....		.....	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

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Maximum, minimum, and mean temperatures—Continued.

JACKSONVILLE, FLA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	74	48	76	55	85	65	82	52	96	73	86	70	90	72	83	71
2	.....	.....	.....	.....	.....	.....	.....	.....	74	60	64	53	75	60	85	58	97	74	87	70	97	74	81	72
3	.....	.....	.....	.....	.....	.....	.....	.....	67	51	70	46	69	51	86	69	95	72	87	70	94	75	85	71
4	.....	.....	.....	.....	.....	.....	.....	.....	63	45	80	53	74	46	84	68	83	72	88	69	95	76	84	70
5	.....	.....	.....	.....	.....	.....	.....	.....	62	44	79	56	72	51	76	58	91	72	92	71	86	74	86	71
6	.....	.....	.....	.....	.....	.....	.....	.....	72	54	79	57	85	57	72	56	92	75	88	75	85	70	86	69
7	.....	.....	.....	.....	.....	.....	.....	.....	65	50	81	66	86	66	77	52	93	74	85	71	89	70	87	79
8	.....	.....	.....	.....	.....	.....	.....	.....	57	45	74	51	88	66	78	54	96	74	86	71	93	70	83	72
9	.....	.....	.....	.....	.....	.....	.....	.....	60	41	71	47	84	65	79	54	98	77	88	73	96	78	89	69
10	.....	.....	.....	.....	.....	.....	.....	.....	58	40	74	43	68	51	79	61	99	77	87	72	90	73	82	66
11	.....	.....	.....	.....	.....	.....	*69	*41	65	37	72	52	64	47	80	66	97	74	90	73	93	70	81	67
12	.....	.....	.....	.....	.....	.....	68	45	69	43	67	50	71	46	80	63	91	71	89	69	100	70	85	64
13	.....	.....	.....	.....	.....	.....	57	43	75	51	67	45	74	62	76	67	92	70	93	71	95	73	83	69
14	.....	.....	.....	.....	.....	.....	60	44	77	61	62	37	78	58	77	67	88	68	88	72	89	73	87	72
15	.....	.....	.....	.....	.....	.....	56	36	68	54	69	51	84	63	85	64	90	73	86	71	90	71	87	73
16	.....	.....	.....	.....	.....	.....	46	35	76	56	81	61	86	66	87	69	92	74	88	70	85	71	91	71
17	.....	.....	.....	.....	.....	.....	44	37	72	47	86	64	79	64	86	67	92	72	90	69	84	68	92	73
18	.....	.....	.....	.....	.....	.....	55	40	56	47	85	64	78	65	87	65	89	70	89	72	87	69	91	72
19	.....	.....	.....	.....	.....	.....	67	50	55	45	85	65	85	65	79	65	87	70	87	72	85	73	89	72
20	.....	.....	.....	.....	.....	.....	71	46	67	49	84	65	87	70	87	65	87	72	83	71	89	74	91	71
21	.....	.....	.....	.....	.....	.....	74	56	81	53	84	62	89	69	91	65	84	72	86	70	90	73	89	68
22	.....	.....	.....	.....	.....	.....	77	56	77	57	85	64	89	64	81	66	83	71	92	73	93	74	85	75
23	.....	.....	.....	.....	.....	.....	77	60	80	57	76	62	89	68	85	65	82	74	90	73	95	73	85	73
24	.....	.....	.....	.....	.....	.....	69	54	70	53	64	48	91	67	91	66	91	69	86	71	93	74	83	69
25	.....	.....	.....	.....	.....	.....	57	39	73	51	66	54	80	60	95	72	96	73	86	69	90	70	80	72
26	.....	.....	.....	.....	.....	.....	56	38	60	41	72	62	78	53	95	73	95	75	88	70	83	70	83	73
27	.....	.....	.....	.....	.....	.....	67	38	70	44	78	57	81	49	98	72	95	70	87	75	82	73	83	70
28	.....	.....	.....	.....	.....	.....	69	54	72	46	83	60	84	60	88	73	83	73	89	74	83	66	79	69
29	.....	.....	.....	.....	.....	.....	58	46	.....	.....	84	63	64	49	88	69	87	72	88	74	88	67	77	56
30	.....	.....	.....	.....	.....	.....	64	42	.....	.....	84	63	76	42	94	65	81	73	90	77	94	73	80	56
31	.....	.....	.....	.....	.....	.....	71	44	.....	.....	87	63	.....	.....	94	72	.....	.....	87	74	93	73	.....	.....
Range	.....		.....		.....		.....		44°		50°		49°		46°		31°		24°		34°		36°	
Monthly means	71°.6		59°.4		56°.4		55°.2		58°.8		66°.3		70°.3		75°.1		80°.6		79°.7		81°.5		77°.4	

* Station supplied with maximum and minimum thermometers January 11, 1874.

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Maximum, minimum, and mean temperatures—Continued.

KEOKUK, IOWA.

Day of month.	1873. October.		November.		December.		1874. January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	70	45	44	24	60	36	48	37	23	20	46	39	42	24	78	53	78	61	91	72	82	69	84	61
2	69	41	57	39	65	59	47	36	30	22	50	39	43	32	65	49	77	53	92.5	71	82	63	88	66
3	63	56	46	25	37	15	65	34	31	20	54	33	57	33	50	42	86	65	98	71	82	60	71	59
4	60	51	60	40	24	11	19	10	28	13	44	26	37	24	53	43	92	64	100	75	83	61	64	56
5	62	40	46	30	26	17	24	5	29	12	46	32	36	26	67	46	78	64	101	79	81	60	76	52
6	51	32	54	30	32	24	31	10	36	28	53	42	43	27	73	49	85	64	99	80	80	63	89	62
7	61	39	62	48	38	29	38	15	33	17	37	26	42	26	78	50	86	64	99	81	83	67	89	68
8	69	44	65	34	49	26	41	27	37	26	36	19	51	31	82	60	92	74	89	70	88	67	89	73
9	75	52	58	41	32.5	22	38	30	33	12	40	29	44	28	82	65	84	67	88	68	91	69	87	67
10	71	59	55	35	43	35	38	25	46	28	37	29	59	34	72	58	83	58.5	90	72	99	78	82	65
11	69	51	52	36	43	36	21	13	47	32	40	25	65	34	74	58	71	58	82	66	99	80	89	67
12	62	39	34	25	35	23	27	11	59	29	30	20	50	31	79	63	71.5	51	85	58	96	75	78	67
13	73	46	41	22	31	19	27	11	32	20	35	15	65	49	79	59	71	56.5	87	69	86	75	81	66
14	76	49	43	21	39	22	8	— 5	44	25	39	28	58	46	80	62	70	59.5	93	72	83	64	80	53
15	73	50	64	39	46	31	8	— 8	41	33	47	37	50	36	68	54	78	64	87	71	85	65	64	45
16	70	61	53	41	50	36	27	8	43	30	48	41	40	33	71	49	81	61	83	63	90	63	70	48
17	69	56	45	35	47	35	40	21	33	28	68	48	53	33	67	55	87	64	87	64	91	65	77	54
18	55	43	33	16	37	32	41	38	37	22	61	39	61	41	67	46	88	67.5	91	64	92	68	75	66
19	51	37	26	11	29	25	33	28	42	32	45	32	53	44	78	53	90	68	97	73	94	75	67	55
20	52	35	42	20	18	8	39	29	34	19	56	35	48	43	72	54	92	70	80	68	93	76	67	46
21	59	37	48	26	29	11	41	37	33	31	50	34	51	42	70	50	93	69	74	64	96	77	70	55
22	48	32	47	30	39	24	39	26	39	29	52	32	52	37	73	52	94	72	80	63	87	67	76	55
23	49	26	35	32	39	33	24	13	21	19	32	21	44	31	80	59	95	74	91	69	77	64	79	54
24	54	36	48	30	38	35	24	1	18	— 1	41	20	54	35	92	69	94	77	92	76	79	63	76	58
25	56	37	36	31	35	34	36	16	23	10	51	35	57	41	82	63	92	76	97	80	82	63	72	65
26	45	36	55	30	34	28	47	35	37	20	47	29	56	40	86	61	94	76.5	91	71	78	61	73	58
27	40	30	29	22	26	19	44	27	41	18	38	23	54	38	92	69	94	78	80	65	72	65	61	50
28	34	24	27	13	39	16	35	21	45	35	44	27	51	34	91	69	95	74.5	79	62	76	68	69	46
29	41	23	38	23	25	19	49	33	.....	.....	47	30	59	42	87	68	84	65	86	67	83	68	75	54
30	46	27	42	25	36	15	35	19	.....	.....	48	40	76	46	91	70	88	65	91	74	79	68	69	49
31	36	20	.....	.....	44	32	25	16	.....	.....	41	28	.....	.....	84	71	.....	.....	86	69	79	61	.....	.....
Range	56°		54°		57°		73°		60°		53°		52°		50°		44°		43°		39°		41°	
Monthly means	49°.8		38°.0		32°		27°.8		29°.4		38°.3		44°.6		67°.2		76°.7		80°.5		76°.8		67°.1	

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Maximum, minimum, and mean temperatures—Continued.

KEY WEST, FLA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	86	76	73	69	75	71	68	60	82	71	89	71.5	86	76	83.5	69	93	77	91	78	93.5	81.5	89	76
2	85	77	82	71	80	71	70.5	64	79.5	70.5	80	70.5	88.5	70	85	74	90	78.5	89	74	95	81	88	75
3	84	76	82	71	80	73	74	65	81	71	75.5	65.5	82	72	86.5	76	88.5	77	88	77	94	81	88	79
4	84	76	84	76	76	72	73	67	78.5	69	83	66.3	87	75	87	77	87.5	76.5	92	78	92	81	87	79
5	83	77	84	76	81	73	75	65	78	69	81.5	68	86	74.5	83	74	91	78	90	76	90	80	87	77
6	82	76	84	76	80	72	80	67	80.5	70	82	72.5	86	77	80	71	92	77	94	77	88	81	87	75
7	79	70	87	76	79	71	72	63	83	70	84	73	86	76.5	80	68.5	88	79	90	80	90	79	88	79
8	78	65	79	74	77	71	67	58.5	78	69.5	81	71	87	77	79.5	56	93	79	92	77	92	80	90	77
9	80	72	78	73	79	71	65	56	71	60.5	75.5	68	87	77	79	69	88	79	91	77	90	81	86	75
10	81	73	75	72	78	71	71	57	64	58	76.5	67	81	70	82	74	90	77	91	80	91	76	81	75
11	82	73	80	72	77	69	73	62	70	61.5	82	66.5	74.5	66	84	74	88	78	91	79	92	79	87	75
12	82	73	82	72	80	70	74	64	78.5	62.5	76	70	79.5	69	86	72	92	79	90	79	91	81	82	74
13	83	73	72	63	82	73	74	66	81.1	70.8	75	68	79	67	86	73.5	87	74	88	78	87.5	77.5	83	74
14	82	74	66	60	75	68	74	66	80.8	71	79	69	80.5	71	90	73	82	74	86	77	93	78	89	76.5
15	82	73	72	64	74	68	69	61	85.2	70	82.5	73	83	73	90	74	87	78	89	76	89	79	89	79
16	83	75	77	65	74	69	69.5	62	84.5	70	82	73	83	73	87	75	88	79	90	79	90	79	87	79
17	82	75	77	69	72	68	72	65	81.5	71	83	73	85	76	87	72.5	89	78	88	78	91	78	89.5	78
18	81	75	79	69	72	68	72	64	84	73	82.5	73	85	75.5	87	75.5	90	79	86	77	92	80	90	80
19	80	75	75	63	74	68	72	65	82	72.5	84	73	85	75	89	75	91	79	92	77	87	80	90	81
20	76	67	65	54	74	68	76	67	82	72.2	84.5	74	87	76	89.5	75	90	79	86	78	84	76	89	78
21	72	66	66	52	74	65	78.5	70	82	73	85	74	87	74	90	75.5	88	79	90	79	82	77	89	78
22	75	66	72	64	80	70	80	71	82	73	83	73	85.5	75	85.5	76	89	77	91	80	88	77	87	78
23	76	67	78	69	80	70	79	72	80	72.5	88	73	89	75	88	75.5	86	78	91	79	88	76	83	71
24	81	70	83	73	79	70	79	70	83	73	87	73	88	75	87	76	89	79	92	81	89	79	85	74.5
25	81	71	79	69	76	70	74.5	65	87	72.5	88	73	85	75	88	77	90	79	92	81	90	81	81	74
26	82	72	73	65	70	65	72	64.5	80	72.5	88	75	78	71	87	78	90	79	91	82	89	80	86.5	75
27	86	73	83	69	74	65	73	63	84	73	87	74	82	73	88	76.5	90	78	92	79	91	75	88	76
28	85	74	74	67	66	57	70.5	67	85	72	87	74	85	71	86.5	78	88	78	90	79	87	79	85	78.5
29	75	69	71	65	65	54	77	68	.....	.....	87	74	80	68	86.5	78	90	79	91	80	90	79	90	79
30	73	71	74	68	64	61	74	67	.....	.....	86	74.5	79	66	88	77	.....	.....	94	79	89	79	81	76
31	74	69	.....	.....	67	58	80.2	67	.....	.....	86	74	.....	.....	90	77	.....	.....	95	80	88	79	.....	.....
Range	21°		35°		28°		24°.2		29°		23°.5		23°		34°		19°		21°		20°		16°	
Monthly means	76°.4		72°.7		71°.4		68°.5		74°		76°.1		78°		80°		83°		83°		84°		74°.7	

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Maximum, minimum, and mean temperatures—Continued.

KINGSTON, CANADA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	M n.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	62	43	55	27	9	— 2	38	29	4	—17	40	20	35	10	51	33	59	47	66	52.9	77.2	62.5	83	62
2	55	41	55	35	40	— 2	38	33	7	—17	46	30	42	26	42	30	61	42	71.5	60.5	72.5	53.4	76.2	59
3	52	41	52	27	49	30	49	36	16	— 3	50	36	33	17	55	33	66	47	72.5	52.9	69.7	42.3	72.3	47.3
4	59	42	58	25	61	29	59	43	25	5	45	11	25	7	60	36	69	54	74.5	57.9	69.5	43.2	65.5	42.8
5	60	52	49	27	40	20	53	17	13	— 3	25	10	35	15	60	40	78	58	67.5	60.5	74.2	52.5	77.5	51.5
6	57	37	40	20	32	25	32	18	11	—13	27	15	37	28	53	33	72	58	78.9	58.1	75.5	56.9	73.5	58.3
7	53	31	54	31	32	18	37	25	14	3	39	18	41	30	48	28	76	57	78.5	64	74.1	62	74.3	52.9
8	65	39	49	40	42	21	37	31	23	— 7	36	27	39	27	58	37	64	52	76	58.7	77.5	64	81.5	54.6
9	68	44	51	27	44	35	38	30	29	3	30	9	41	24	70	40	70	48	81.4	61.5	81.6	61	81.3	55.7
10	66	42	31	20	42	29	39	31	25	9	22	10	39	25	63	46	70	54	69.5	64	76.3	64	81.2	63
11	67	54	41	25	40	28	34	19	24	0	17	6	35	20	65	45	60	46	71.5	59.4	79.1	66.1	81.6	64
12	60	38	47	26	41	26	25	13	29	— 6	11	3	37	13	69	47	62	49	67.4	52.9	83.5	70	79.8	56.9
13	54	36	33	18	31	13	14	7	55	29	20	5	40	25	67	46	69	48	69.5	61.9	77	59.6	77.5	54.9
14	65	52	27	13	32	4	18	4	40	19	32	14	50	25	65	49	63	48	79.5	56.9	78	51.5	81.6	66
15	60	41	34	25	37	27	10	3	40	18	30	24	53	34	75	45	69	56	76.3	61.8	75.9	61.6	77.5	59.3
16	63	47	34	23	46	30	12	— 9	37	21	45	20	40	25	72	45	66	58	71	58	76	58.4	64.6	55.2
17	57	39	27	23	42	32	23	— 7	28	10	45	33	40	30	58	44	62	55	72.5	59	79.6	65	62.3	54.4
18	63	43	31	25	42	32	35	21	22	4	49	40	42	23	55	42	74	57	75	61.5	67	62.6	68.6	57.6
19	56	42	30	17	35	17	39	17	37	11	52	32	52	32	55	43	72	57	82.4	63.5	74.5	61	74	62
20	46	36	27	14	30	11	20	2	41	25	42	24	43	32	54	44	64	53	74.5	59.9	80	65	67.5	48.1
21	62	41	27	15	25	3	37	7	38	24	49	29	42	33	54	44	71	53	73.8	57.7	70.5	56.4	67.3	42.8
22	62	47	27	15	30	18	47	34	31	19	35	26	47	32	65	40	72	55	72.3	54.4	69.5	52.1	65.5	42.8
23	61	47	27	19	35	18	46	23	39	24	26	8	45	32	60	43	74	60	78.5	59.4	68.8	48	67.5	51.9
24	61	42	27	20	32	23	27	11	32	9	26	4	40	29	73	47	68	53	82.2	65.1	71.5	48.4	69.5	54.1
25	61	32	23	11	31	18	12	— 7	29	16	38	20	49	28	62	49	67	54	82.6	66	73.5	56.4	71.5	58.3
26	50	34	15	— 3	35	19	4	—16	29	10	38	25	43	30	55	46	70	56	77.5	67	73.8	59.9	78.2	57
27	58	36	15	2	25	18	17	— 2	31	14	33	17	43	30	58	48	72	53	73.3	57.2	74.1	55.3	72.8	63.5
28	55	33	21	5	27	18	25	6	35	14	35	20	41	21	69	49	80	53.2	66.7	57.7	76.7	56.2	82.4	51.7
29	50	28	26	11	33	15	16	1	.....	.....	31	11	40	27	78	52	82	63	76.3	57.1	73.6	59.2	62.5	49.1
30	51	24	15	4	26	0	2	—15	.....	.....	38	25	48	30	71	56	68.8	55.2	79.3	53.4	77.3	57.1	55.1	40.4
31	52	29	.....	.....	35	22	6	—11	.....	.....	31	15	.....	.....	72	53	.....	.....	76.5	58.9	77.6	57.1	.....	.....
Range	44°		61°		63°		75°		72°		49°		46°		50°		40°		32°.6		41°.2		42°.6	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

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Maximum, minimum, and mean temperatures—Continued.

KINGSTON, JAMAICA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	77	73	86	75	84	70	82	69	.....	.....	.....	.....	83	74	81	75	.....	.....	85	76	.....	.....	88	79
2	82	75	88	73	85	70	78	69	.....	.....	.....	.....	84	72	84	74	.....	.....	86	74	.....	.....	89	79
3	83	78	87	73	85	69	81	70	.....	.....	.....	.....	85	78	83	77	.....	.....	.....	.....	.....	.....	87	80
4	85	74	90	72	83	69	85	71	.....	.....	.....	.....	83	77	85	76	.....	.....	86	76	.....	.....	87	80
5	85	75	89	72	84	71	83	70	.....	.....	.....	.....	83	74	83	76	.....	.....	84	76	.....	.....	88	76
6	85	72	89	72	82	69	85	71	.....	.....	.....	.....	78	76	84	75	.....	.....	81	76	.....	.....	89	74
7	86	76	85	73	84	70	83	70	.....	.....	.....	.....	83	77	84	76	.....	.....	86	77	.....	.....	89	75
8	86	73	84	73	86	73	82	70	.....	.....	.....	.....	83	77	.....	.....	.....	.....	85	80	.....	.....	81	75
9	86	74	83	73	85	73	82	68	.....	.....	.....	.....	80	77	83	76	.....	.....	85	79	85	74	80	74
10	85	74	86	73	87	71	84	69	.....	.....	.....	.....	83	76	.....	.....	.....	.....	86	79	84	75	80	76
11	85	72	84	72	83	69	85	68	.....	.....	.....	.....	83	77	.....	.....	.....	.....	84	82	85	75	81	76
12	86	73	88	74	83	69	82	70	.....	.....	.....	.....	83	79	.....	.....	.....	.....	90	75	85	75	.....	.....
13	84	72	83	74	81	71	85	73	.....	.....	.....	.....	79	78	.....	.....	.....	.....	85	80	81	72	86	80
14	87	73	83	72	84	67	78	70	.....	.....	.....	.....	78	76	.....	.....	88	77	85	80	84	74	80	74
15	82	74	87	75	83	66	83	72	.....	.....	.....	.....	80	77	.....	.....	83	77	84	80	82	75	88	70
16	86	72	84	74	85	72	83	68	.....	.....	.....	.....	81	79	.....	.....	89	78	84	80	81	75	88	70
17	78	75	82	71	85	70	82	68	.....	.....	.....	.....	81	75	.....	.....	90	78	84	80	85	76	89	82
18	85	70	84	71	85	68	82	73	.....	.....	.....	.....	81	77	.....	.....	90	78	85	80	83	77	81	70
19	84	72	84	77	82	69	83	72	.....	.....	.....	.....	80	73	.....	.....	85	82	92	80	85	76	81	70
20	85	71	79	72	85	70	82	71	.....	.....	.....	.....	80	78	.....	.....	.....	.....	85	76	86	76	87	70
21	85	75	84	72	85	68	85	73	.....	.....	.....	.....	82	79	.....	.....	87	75	89	80	83	77	80	70
22	87	74	81	74	83	71	83	73	.....	.....	83	74	80	75	.....	.....	87	75	81	74	80	79	81	77
23	84	73	84	71	85	69	85	72	.....	.....	83	72	83	76	.....	.....	88	81	89	76	91	81	87	71
24	89	72	82	71	81	71	85	72	.....	.....	84	73	82	78	.....	.....	89	82	84	74	91	81	.....	.....
25	85	72	84	72	82	68	83	73	.....	.....	83	73	81	79	.....	.....	89	77	85	80	89	80	.....	.....
26	83	73	84	70	84	70	80	71	.....	.....	84	74	83	77	.....	.....	78	75	.....	.....	88	76	.....	.....
27	82	70	85	71	84	71	80	73	.....	.....	78	74	84	77	.....	.....	86	81	.....	.....	88	76	.....	.....
28	84	71	87	71	83	71	80	72	.....	.....	77	74	81	75	.....	.....	86	81	.....	.....	88	76	.....	.....
29	85	71	84	70	85	71	82	69	.....	.....	80	79	82	76	.....	.....	86	74	.....	.....	87	76	.....	.....
30	85	71	86	71	80	70	83	69	.....	.....	81	77	86	76	.....	.....	85	74	.....	.....	84	78	.....	.....
31	88	72	.....	.....	82	70	83	69	.....	.....	82	74	.....	.....	.....	.....	.....	.....	.....	.....	85	79	.....	.....
Range	19°		20°		21°		17°		.....		.....		14°		.....		.....		.....		.....		.....	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

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Maximum, minimum, and mean temperatures—Continued.

KNOXVILLE, TENN.

Day of month.	1873. October.		November.		December.		1874. January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																			92	69	87	68	82	59
2																			90	69	84	67	83	62
3																			91	66	87	60	85	60
4																			95.2	67	83	63	85	61
5																			95.2	73	83	58	83	62
6																			93	70	82	67	84	66.5
7																			95	65	79	67	84.2	62.5
8																			96	71	79	71	86	63
9																			92	66	79	64	88	62
10																			87	69	84	65	83	63
11																			77	68	94	68	85	58
12																			86	65	97	71	85	58
13																			91	64	95	73	86.5	59
14																			91	67	91	70	78	65
15																			85	64	83	65	83	65
16																			89	67	85	68	84	66
17																			78	62	76	63	81.5	64
18																			90	66	78	60	84	63
19																			93	65	92	60	83	61
20																			89	65	92	66	73	57
21																			90	65	78	69	74	51
22																			89	70	76	69	78	55
23																			74	63	75	67	79	54
24																			92	72	83	67	78	57
25																			83	70	80	61	72	60
26																			89	71	83	58	80	63
27																			81	71	72	64	67	60
28																			79	67	65	60	66	56
29																	82	70	78	66	64	53	68	52
30																	84	67	82	68	77	61	73	51
31																	89	67	87	58	79	61		
Range																			38		39		37	
Monthly means	58°.1		44°.5		42°.2		38°.9		43°.4		50°.2		54°.2		65°.5		76°.1		77°.1		73°.8		69°.2	

Station supplied with maximum and minimum thermometers June 28, 1874.

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Maximum, minimum, and mean temperatures—Continued.

LA CROSSE, WIS.

Day of month.	1873. October.		1873. November.		1873. December.		1874. January.		1874. February.		1874. March.		1874. April.		1874. May.		1874. June.		1874. July.		1874. August.		1874. September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	58	31	41	15	38	29	40	23	19	− 5	46	28	48	16	57	42	77	54	82	68	77	61	81	55
2	67	32	43	26	38	30	42	22	29	− 7	52	28	36	26	63	38	62	52	76	61	75	56	76	60
3	62	45	40	15	32	16	57	24	34	13	44	26	31	24	56	39	67	55	95	62	70	64	67	49
4	52	42	45	29	16	− 3	24	5	26	15	28	11	36	13	63	39	81	54	99	73	80	66	66	54
5	52	39	35	18	10	− 5	22	1	28	− 4	42	20	43	29	71	45	76	56	101	72	73	60	71	52
6	51	30	45	21	19	0	31	15	32	22	37	22	46	29	74	57	66	54	100	74	80	61	83	55
7	65	33	52	33	32	10	33	8	37	24	30	14	54	22	74	41	83	56	97	70	76	63	90	66
8	71.5	44	53	27	43	28	34	15	33	15	23	3	40	27	59	58	76	61	87	68	83	63	91	72
9	73	52	38	28	38	14	30	23	30	5	32	8	45	24	89	67	72	60	88	69	84	65	89	68
10	61	52	46	30	32	10	30	11	32	15	33	19	64	29	74	64	63	56	79	68	88	65	70	71
11	59	44	38	25	40	27	16	5	38	1	37	7	40	27	71	58	60	46	84	62	96	73	86	68
12	62	32	27	18	30	21	22	9	32	24	19	6	55	24	74	55	62	41	85	57	90	72	79	62
13	69	50	26	18	30	12	22	3	24	1	27	3	62	40	74	48	74	54	90	57	75	59	75	57
14	68	36	31	11	32	11	3	−19	41	1	43	12	50	36	63	47	68	57	97	73	77	61	68	44
15	74	49	53	25	40	12	11	−15	33	18	46	28	42	30	57	44	72	60	76	65	81	67	60	42
16	63	50	41	33	45	27	20	4	29	10	55	37	47	30	72	45	74	49	86	59	78	65	65	43
17	65	45	38	31	35	26	36	18	42	−11	59	35	61	32	60	45	92	63	87	62	79	67	68	50
18	50	40	33	11	27	12	40	30	38	16	38	32	56	40	72	47	91	64	79	69	71	58	62	52
19	53	33	19	4	26	15	33	20	40	14	37	24	47	31	55	50	90	70	90	68	92	70	55	50
20	55	32	28	9	15	1	33	16	37	3	55	33	45	30	67	50	92	70	75	63	74	60	60	41
21	55	30	38	18	19	− 4	36	24	28	14	38	21	50	30	78	49	93	67	93	58	87	67	65	45
22	47	24	34	18	34	19	24	10	28	13	40	23	46	34	56	53	89	71	86	60	70	61	74	51
23	43	18	31	20	37	30	15	− 1	17	0	23	3	41	25	57	37	91	71	93	68	77	56	76	50
24	44	26	46	22	37	33	14	9	7	−11	40	7	54	31	87	62	97	78	92	71	77	60	77	56
25	37	31	33	22	35	30	13	−10	13	−19	33	27	48	34	80	57	92	76	92	77	79	56	68	56
26	37	28	33	21	31	23	36	4	31	− 4	27	12	50	37	87	65	94	71	76	69	72	59	67	52
27	34	26	26	13	23	15	37	27	38	− 1	35	7	43	35	96	68	98	74	77	61	78	66	58	51
28	33	22	22	− 1	27	7	27	16	42	14	30	12	55	34	95	73	93	65	82	59	80	68	68	44
29	33	19	28	9	23	9	21	10	.....	.....	38	16	54	35	91	72	80	60	86	62	82	69	66	47
30	33	19	32	18	33	5	19	5	.....	.....	40	25	76	45	90	71	85	63	86	71	79	61	67	41
31	31	18	.....	.....	37	24	16	1	.....	.....	40	19	.....	.....	77	63	.....	.....	80	65	79	55	.....	.....
Range	58°		54°		50		76°		61		56		63°		58°		40°		44°		41°		50°	
Monthly means	40		25°.9		24°.2		29°.2		21°.3		29°.4		46°.5		64°.3		70°.8		77°.1		71°.9		62°.9	

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Maximum, minimum, and mean temperatures—Continued.

LAKE CITY, FLA.

Day of month.	1873. October.		November.		December.		1874. January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	70	84	71	94	71	83	67
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	72	90	71	96	74	79	71
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	95	69	82	72	94	71	86	71
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	75	89	69	95	73	85	70
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	72	92	72	90	72	89	68
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	74	92	76	90	69	88	69
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	96	73	88	71	91	67	89	69
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	*52	95	73	89	69	94	72	84	70
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	56	97	74	89	71	96	75	89	66
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	55	93	74	79	72	92	73	83	64
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	60	92	74	86	72	93	67	80	59
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	63	91	73	90	71	99	73	85	63
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	65	91	69	86	70	94	71	84	66
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	66	88	67	90	67	92	71	86	71
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	65	89	72	90	70	91	70	90	72
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	68	92	73	91	70	89	70	90	70
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	64	92	73	93	69	88	67	89	70
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	65	84	71	92	69	86	65	93	70
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	66	86	70	89	70	89	71	91	72
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	64	89	69	84	70	91	72	90	70
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	62	87	69	88	69	93	72	90	67
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	64	86	70	92	71	94	72	87	70
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	65	88	69	92	70	95	72	86	66
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	65	92	68	90	72	92	74	84	70
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	68	95	72	89	72	89	72	84	71
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	95	68	94	72	90	69	86	71	84	71
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	97	67	93	71	91	74	85	66	79	67
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	67	77	70	83	73	85	63	78	64
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	67	83	72	80	72	89	65	77	55
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	64	88	73	88	76	95	71	79	54
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	73	.....	.....	91	73	90	69	.....	.....
Range																	30		29		38		37	
Monthly means	65°.2		57°.3		54°.7		53°.9		59°.5		65°		67°.8		74°.2		78°.7		78°.5		82°.1		75°.5	

*Station supplied with maximum and minimum thermometers May 8, 1874.

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Maximum, minimum, and mean temperatures—Continued.

LEAVENWORTH, KANS.

Day of month.	1873.								1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	69	41	48	28	65	37	56	36	28	21	60	32	48	20	82	58	76	66	93	65	87	72	93	67
2	73	51	62	44	67	26	56	31	30	14	63	38	46	34	79	60	85	66	95	65	85	68	84	65
3	72	57	57	34	26	10	61	18	34	16	61	32	65	32	68	43	92	66	97	69	93	62	65	53
4	69	51	63	39	26	8	18	2	44	13	43	24	48	28	65	41	90	65	100	68	97	72	70	53
5	62	44	46	33	32	21	27	2	32	17	47	36	39	29	71	42	83	62	98	67	107	76	85	52
6	53	31	65	30	32	25	37	13	42	16	50	31	48	32	76	45	92	66	95	71	94	71	92	60
7	66	35	64	44	40	30	41	13	41	7	38	25	48	33	82	47	96	72	97	75	89	69	91	69
8	75	46	75	36	45	26	44	26	41	25	42	19	57	33	85	48	94	74	103	77	85	66	82	70
9	78	52	75	39	34	16	47	33	47	10	65	38	55	26	78	61	89	72	92	68	105	72	85	72
10	76	57	69	40	42	22	41	30	46	18	40	27	68	32	71	63	88	71	90	68	102	80	84	73
11	69	49	56	39	41	36	31	16	49	22	43	22	78	47	81	54	73	50	85	62	106	84	86	69
12	69	41	42	28	36	12	37	21	51	20	41	26	69	43	82	58	76	50	85	66	102	75	79	64
13	79	52	50	27	37	9	32	7	37	16	44	17	64	43	76	59	71	56	92	69	102	75	71	62
14	80	54	58	25	46	23	14	2	50	26	44	27	58	45	77	60	70	62	97	73	87	68	70	48
15	74	54	68	45	51	28	20	2	44	26	48	38	54	34	69	56	75	62	87	76	86	71	65	42
16	75	55	59	39	54	34	37	13	49	27	50	42	46	34	78	47	86	59	88	65	91	71	71	44
17	69	53	68	37	50	28	39	28	43	34	69	49	55	32	74	60	87	62	85	71	94	66	79	58
18	55	39	42	21	43	27	44	28	42	28	55	37	57	35	75	49	90	66	92	68	94	67	87	54
19	62	35	35	12	34	19	28	17	48	30	47	31	58	39	84	55	91	66	95	71	94	67	67	49
20	59	36	54	22	26	9	37	26	42	23	60	32	51	35	77	58	92	69	96	73	92	71	69	46
21	68	37	53	25	39	19	44	24	38	20	53	35	50	35	73	51	91	70	95	74	98	71	67	56
22	54	31	43	38	42	33	28	14	27	11	59	31	54	36	82	55	93	68	93	71	88	71	75	52
23	56	22	42	34	37	33	34	7	21	5	47	24	55	33	94	57	92	70	102	74	83	66	75	56
24	57	28	54	29	36	30	31	4	19	3	46	22	63	37	94	68	90	70	101	79	96	63	73	61
25	56	42	45	30	35	29	43	19	28	7	60	36	62	45	88	66	92	73	104	81	90	63	78	65
26	50	30	58	31	36	22	45	35	41	16	52	30	69	39	94	57	93	73	86	62	90	68	71	56
27	43	26	31	22	26	11	45	24	43	26	46	23	65	45	92	67	95	70	86	62	87	72	67	49
28	36	21	33	18	46	21	46	18	46	39	47	26	65	37	88	69	83	70	88	68	97	73	74	47
29	59	24	45	22	35	18	50	34	.....	.....	47	31	69	38	84	67	86	62	92	64	91	69	82	52
30	49	27	50	28	40	11	40	18	.....	.....	47	36	83	50	91	70	87	62	96	66	87	62	75	51
31	40	19	.....	.....	47	29	26	19	.....	.....	39	27	.....	.....	85	67	.....	.....	100	73	84	58	.....	.....
Range	61°		63°		59°		59°		48°		52°		63°		53°		46°		42°		45°		51°	
Monthly means	56°.9		41°.8		31°.9		28°.4		28°.8		40°		49°		67°.3		77°.4		82°.8		81°3.		66°.8	

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Maximum, minimum, and mean temperatures—Continued.

LEXINGTON, KY

Day of month.	1873. October.		November.		December.		1874. January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	66	45	47	32	60	40	41	33	35	25	54	35	35	25	73	41.5	75	60	70	65	73	70	71	60.5
2	74	53	60	35	57	51	51	40	39	32	55	44	47	30	69	53	76	55	70	64	79	66.5	73	64
3	75	60	52	42	65	56	60	49	34	32	60	44	55	33	64	49	78	67	73	63	77	62	76	67.5
4	71	60	46	40	57	31	65	26	36	26	57	32	47	33	62	46	77	66	73	63	79	63	76	67
5	75	53	61	44	31	31	31	25	36	29	54	32	56	36	55	44	76	67	75	66	80	66	76	60
6	63	36	61	36	35	22	32	30	37	28	56	46	52	31	65	44	76	66	73	64	74	64	76	62.5
7	54	30	56	46	48	32	31	27	38	30	51	40	56	32	65	46	80	74	76	69	74	69	76	62
8	66	44	57	45	63	47	39	24	39	25	43	33	52	44	57	55	82	73	78	70	73	70	76	65
9	75	52	51	33	43	33	42	30	40	25	46	35	45	32	70	58	91	77	78	69	87	69	80	65
10	77	57	47	33	44	33	40	32	42	33	50	35	45	29	73	61	93	73	78	66	85	66	80	65
11	78	58	65	34	67	45	40	25	50	31	41	33	63	35	74	50	85	72	77	66	94	73	80	67
12	68	43	47	30	68	57	37	16	59	42	58	36	63	43	75	65	86	66	78	64	97	78	80	67
13	66	42	35	24	61	29	36	26	58	37	35	29	65	40	74	67	72	53	76	66	92	74	76	66
14	71	51	42	32	41	29	32	16	50	33	40	32	70	50	74	60	73	54	78	66	86	66	76	66
15	77	57	63	32	45	29	32	9	52	36	49	32	63	46	74	64	75	67	78	74	86	66	76	66
16	75	57	73	46	50	34	33	—	51	34	52	43	52	40	69	53	75	67	78	74.5	87	66	76	66
17	76	58	46	42	54	37	36	14	35	24	71	49	44	37	69	50	78	68	78	77	87	66	76	66
18	66	45	44	31	55	43	44	29	39	25	63	37	56	35	61	45	85	68	78	76	92	71	76	66
19	59	44	34	15	51	33	47	37	53	45	61	42	60	34	62	50	79	68	78	70	93	71	76	66
20	49	37	31	6	37	24	48	33	55	42	50	35	58	30	63	55	77	68	78	71	93	71	76	67
21	47	35	45	25	36	24	65	47	61	50	52	39	58	30	63	45	92	72	78	68	93	73	76	67
22	70	42	45	32	35	24	65	50	61	45	72	40	61	42	72	60	92	69	78	65	92	73	76	67
23	60	39	52	41	37	26	57	32	56	45	72	49	52	44	65	60	92	72	78	72	93	70	76	67
24	47	35	52	34	37	25	35	29	35	21	59	40	51	42	65	55	95.5	72	78	64	93	73	76	67
25	55	34	40	30	40	28	37	28	34	22	57	29	56	42	70	60	92	76	78	69	93.5	73	76	67
26	61	46	42	24	32	30	45	25	40	20	63	46	59	42	66	60	90	73	78	63	92	73	76	67
27	62	42	48	33	34	24	49	46	44	33	70	33	57	45	75	63	91	76	78	67	93	73	76	67
28	42	26	35	18	30	27	48	32	43	36	49	25	56	35	76	66	93	77	78	69	93	73	76	67
29	42	31	39	17	37	27	37	31	.....	.....	54	34	64	40	78	67	96	78	78	69	93	73	76	67
30	49	32	40	29	33	15	33	28	.....	.....	56	34	64	40	79	67	95	67	79	69	93	73	76	67
31	42	26	.....	.....	36	19	46	26	.....	.....	48	31	.....	.....	79	71	.....	.....	78	64	70.5	64.5	.....	.....
Range	52		59		53		64		51		52		47		48		42.5		39		35		43	
Monthly means	53.8		40.7		39.6		36.5		39.2		44.3		46.9		63.6		77.9		77.4		75.1		70.9	

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Maximum, minimum, and mean temperatures—Continued.

LONG BRANCH, N. J.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	50	29	29	16	48	27	33	26	60	41	77	57	72	67	89	67	78	65
2	.....	.....	.....	.....	.....	.....	48	39	31	12	53	33	39	30	55	41	60	52	75	66	82	60	83	62
3	.....	.....	.....	.....	.....	.....	49	39	39	23	56	37	47	34	61	35	59	53	80	65	74	59	88.5	61
4	.....	.....	.....	.....	.....	.....	55	44	39	25	62	39	41	21	52	42	67.5	57	77	64	75	59	71	58
5	.....	.....	.....	.....	.....	.....	57	34	32	22	48	34	39	20	52	42	65	59	77	64	75	62	68	63.5
6	.....	.....	.....	.....	.....	.....	46	34	28	13	37	29	55	32	51	42	73	59	69	62	78	62	75	64.5
7	.....	.....	.....	.....	.....	.....	54	44	32	19	39	33	45	38	54	42	73	59	72	61	80	64	83	63.5
8	.....	.....	.....	.....	.....	.....	51	37	35	11	43	31	45	33	69	39	88	62	87	65	71.5	63	77	63
9	.....	.....	.....	.....	.....	.....	47	33	38	7	37	28	43	37	79	48	78	67	81	67.5	73	65	70.5	64
10	.....	.....	.....	.....	*60	36	48	36	39	21	34	23	43	35	87	61.5	77	67	78	68	86.5	64	85.5	58.5
11	.....	.....	.....	.....	52	38	43	32	32	19	38	26	54	28	69	44	68	61	82	61	77	69	83	65.5
12	.....	.....	.....	.....	64	44	37	28	39	20	36	20	54	22	51	43	78	59	72	57	77	70	72	65.5
13	.....	.....	.....	.....	57	37	36	26	50	34	29	16	44	23	65	45	86	58	82	57	77	68.5	67	65
14	.....	.....	.....	.....	39	29	32	24	54	37	41	22	63	32	73	51	79	53	89	68	70	65	70	64
15	.....	.....	.....	.....	48	32	26	11	40	34	44	27	64	44	58	48	73	55	91	69	75	63.5	72	62.5
16	.....	.....	.....	.....	62	37	27	8	48	33	39	32	58	43	62	48	70.5	59	94	71	74	64	71	68
17	.....	.....	.....	.....	62	35	27	10	41	22	47	36	44	34	71	53	78	57	78	65	72	65	68.5	62
18	.....	.....	.....	.....	54	39	37	15	37	18	49	40	43	33	57	50	79	64	77	64	88	60	68	62
19	.....	.....	.....	.....	50	38	42	34	41	28	60	40	44	32	63	45	74	58	77	67	76	65	65	64
20	.....	.....	.....	.....	43	36	42	29	45	37	57	40	42	39	65	49	63	54	83	63	92	66	67.5	61
21	.....	.....	.....	.....	44	29	44	32	45	38	52	36	55	39	64	48	76.5	59	78	63	86	74	67	55
22	.....	.....	.....	.....	40	25	57	40	43	37	53	42	51	39	65	47	80	63	78	65	77	63	72	51
23	.....	.....	.....	.....	34	30	64	40	73	35	49	24	44	40	70	46	92	68	83	63	67.5	63	72	51
24	.....	.....	.....	.....	41	31	42	29	53	32	49	18	48	37	59	51	89	67	79	63	68	64	75	55
25	.....	.....	.....	.....	42	26	31	18	38	24	51	23	44	36	62	49	86	59	75	63	67	64	77	56
26	.....	.....	.....	.....	39	34	36	14	36	24	59	42	44	32	69	49	87	66	76	66	67	60	74	60
27	.....	.....	.....	.....	42	33	47	32	40	26	56	35	53	37	67	52	70.5	65	74	66	67	61	70	57
28	.....	.....	.....	.....	41	28	49	36	40	24	47	35	43	36	66	54	87	65	75	65	69	61	64	58
29	.....	.....	.....	.....	43	28	42	29	.....	.....	68	31	39	33	66	54	90	69	72	66.5	68.5	57.5	65	58
30	.....	.....	.....	.....	33	19	39	29	.....	.....	53	31	51	31	70	54	81	69	81	62.5	74	56	64	51
31	.....	.....	.....	.....	33	19	40	25	.....	.....	53	31	.....	.....	68	55	.....	.....	84	63	73	58	.....	.....
Range	.....	.....	.....	.....	.....	.....	49°		66°		52°		43°		46°		40°		33°		36°		37°.5	
Monthly means	.....	.....	.....	.....	38.6°		36°.5		32°.8		38°.7		41°		56°.2		68°.3		71°.4		69°.9		67°.5	

* Station opened December 10, 1873.

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Maximum, minimum, and mean temperatures—Continued.

LOUISVILLE, KY.

Day of month.	1873. October.		1873. November.		1873. December.		1874. January.		1874. February.		1874. March.		1874. April.		1874. May.		1874. June.		1874. July.		1874. August.		1874. September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	68	45	48	27	64	38	44	24	40	29	57	37	40	29	79	54	79	64	90	63	85	71	83	64
2	75	50	60	31	60	55	56	42	40	34	56	45	53	32	75	59	80	61	88	71	81	67	84	66
3	77	52	51	42	66	51	64	42	35	30	65	41	59	35	67	52	87	66	89	66	82	63	88	71
4	69	59	59	35	35	29	63	27	36	30	54	40	52	32	67	48	92	73	98	73	86	64	87	66
5	75	49	62	39	35	26	37	24	45	30	55	36	57	34	56	43	91	69	94	79	86	65	80	73
6	60	43	58	37	37	28	33	30	39	32	60	47	52	33	69	50	91	72	97	71	87	72	82	68
7	64	31	57	42	45	28	37	28	37	33	60	42	58	42	72	47	94	77	102	75	82	71	88	71
8	68	40	60	44	60	38	40	23	41	31	48	33	54	46	81	53	95	76	94	77	85	63	89	73
9	77	46	57	45	58	37	45	29	39	28	51	30	50	32	82	63	94	76	92	77	90	68	90	68
10	79	53	57	40	56	35	57	34	42	26	54	39	52	30	86	63	95	68	84	72	91	68	88	69
11	72	57	62	36	66	46	42	29	55	36	43	27	68	39	85	62	89	67	78	68	99	77	87	61
12	62	48	51	30	66	54	51	21	62	45	41	29	54	33	88	50	74	61	79	65	102	79	89	63
13	66	41	37	25	40	32	34	29	57	39	37	23	69	42	83	65	74	54	89	66	98	77	90	70
14	74	48	47	26	42	28	29	16	48	31	44	28	76	56	84	63	83	58	93	75	85	67	88	73
15	77	49	66	27	46	28	18	4	57	35	52	38	65	54	87	64	87	70	94	77	80	67	83	66
16	78	56	60	49	52	30	24	8	49	36	53	42	54	42	64	57	82	68	81	70	87	60	70	62
17	78	62	52	42	55	34	40	12	39	30	75	52	48	38	70	53	81	66	84	63	90	70	78	64
18	61	56	42	32	50	34	47	30	42	29	66	39	61	40	64	48	87	63	90	68	94	76	83	65
19	54	43	23	19	51	35	49	38	57	30	66	42	60	40	72	48	90	73	93	72	96	77	78	61
20	52	37	36	15	35	24	43	36	53	47	52	38	65	49	78	57	90	69	92	75	95	77	70	54
21	52	39	48	33	34	20	69	40	59	46	61	41	60	40	69	48	93	70	90	73	92	81	70	49
22	71	40	47	29	40	24	68	51	59	42	61	41	63	40	72	50	91	73	83	69	90	71	76	52
23	65	32	52	29	45	29	68	32	44	26	59	33	52	43	70	54	95	75	89	72	82	71	80	54
24	51	31	54	37	43	31	39	25	38	24	45	36	50	33	88	55	93	77	94	77	80	66	79	58
25	59	52	46	34	43	30	41	22	38	23	60	47	60	44	84	72	92	76	92	73	83	64	81	65
26	62	49	49	31	40	32	51	22	45	24	67	48	61	45	84	67	92	69	100	80	85	67	78	69
27	52	42	49	34	33	28	53	39	45	34	44	32	62	47	87	69	95	78	81	69	79	67	74	60
28	49	32	34	26	34	26	50	35	47	33	48	30	54	39	91	61	100	81	74	62	72	67	64	54
29	43	27	40	22	37	22	50	30	.....	.....	51	34	54	37	85	69	88	73	80	62	75	66	73	51
30	52	39	41	26	32	17	58	30	.....	.....	57	39	69	40	88	71	86	66	82	62	79	65	69	54
31	52	29	.....	.....	41	22	41	29	.....	.....	48	34	.....	.....	91	73	.....	.....	90	67	83	65	.....	.....
Range	50°		51°		49°		65°		39°		52°		47°		48°		46°		40°		42°		41°	
Monthly means	54°		41°.5		38°.7		37°.5		39°.5		45°.6		48°.8		68°.2		80°.7		80°.7		70°.3		72°.2	

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Maximum, minimum, and mean temperatures—Continued.

LYNCHBURG, VA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	72	85	70	88	67	82	55
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	62	85	72	85	66	84	56
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	57	89	70	82	62	85	58
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	87	60	93.5	72	80	65	84	61
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	71	93	72	80	60	84	68
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*67	*41	85	71	86	63.5	76	63	85	63
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69	41	89	70	87	60	72	67	86.5	64
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	41	95	72	92	68	84	65	89	63
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	48	97	75	94.5	72	84	65	81	65
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	59	96	70	93	74	85	63	79	59
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	57	83	69	85	74	89	69	85	55
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	49	87	69	82	69	90	67	88	61
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	58	80	63	85	67	89	69	85	63
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	81	60	77	57	90	70	83	70	78	70
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	60	80	60	91	67	81	64	72	69
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	60	80	62	90	71	81	60	80	68
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	59	37	83	66	85	67	80	60	78	68
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	56	87	65	88	65	86	61	84	65
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	48	86	65	88	67	89	64	79	70
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	52	84	63	91	64	92	65	76	58
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	52	83	64	89	72	92.5	68	71	52
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	44	88	65	83	68	87	71	71	53
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	48	93	70	84	65	72	65	74	51
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	60	93	73	86	67	70	63	73	54
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	63	95	72	82	69	75	63	76	52
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	82	58	84	74	75	67	72	62	78	52
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	55	81	74	76	67	70	56	73	62
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	87	57	94	71	73	68	72	50	68	59
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	57	95	75	75	67	73	52	66	55
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	67	85	73	80	60	68	58	66	51
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	66	.....	.....	85	59	72	60	.....	.....
Range	.....		.....		.....		.....		.....		.....		.....		.....		40°		35°.5		42°.5		38°	
Monthly means	53°.6		42°.5		40°.4		39°.9		41°.1		47°.5		51°		66°.1		77°.4		77°.9		72°		69°	

*Station supplied with maximum and minimum thermometers May 6, 1874.

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Maximum, minimum, and mean temperatures—Continued.

MARQUETTE, MICH.

Day of month.	1873. October.		1873. November.		1873. December.		1874. January.		1874. February.		1874. March.		1874. April.		1874. May.		1874. June.		1874. July.		1874. August.		1874. September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																	53	38	65	50	60	53	82	51
2																	56	35	63	51	65	47	67	51
3																	57	44	74	51	69	44	65	48
4																	73	43	69	49	75	48	67	44
5																	62	46	85	52	64	57	64	53
6																	57	45	83	66	73	59	75	53
7																	60	44	80	61	72	56	87	59
8																	74	46	70	54	89	62	97	59
9																	57	47	76	49	89	66	87	70
10																	53	39	70	54	84	63	91	67
11																	53	42	70	47	88	63	84	68
12																	56	37	82	52	66	52	75	58
13																	65	44	85	52	63	47	56	40
14																	67	52	93	64	63	44	67	40
15																	60	51	79	54	75	49	66	48
16																	61	48	72	46	82	66	76	47
17																	68	54	79	53	78	60	85	60
18																	87	53	81	53	74	64	79	59
19																	83	61	88	55	81	61	73	55
20																	79	54	77	57	75	52	56	40
21																	78	56	77	58	71	55	67	40
22																	87	67	88	57	67	53	66	48
23																	72	60	78	56	68	47	76	47
24																	82	52	79	54	69	45	85	60
25																	92	56	88	67	72	49	79	59
26																	65	56	73	54	80	58	73	55
27																	77	55	72	49	81	63	60	50
28																	88	55	70	45	78	61	68	46
29															*78	*44	68	48	74	46	75	60	59	44
30															78	56	67	47	69	57	67	54	53	39
31															66	46			81	53	72	49		
Range																	57°		46°		45°		58°	
Monthly means	43°		26°		26°.8		23°.4		19°.2		23°.9		30°.3		51°.3		58°.8		64°.5		62°.9		60°.2	

Station supplied with maximum and minimum thermometers May 20, 1874.

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Maximum, minimum, and mean temperatures—Continued.

MEMPHIS, TENN.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																	89	70	90	71	96	69	88	68.5
2																	89	69	92	71	86	74	89	69
3																	89	69	92	72	89	70	89	69
4																	91	70	94	72	90	69	90	69
5																	92.5	70	93	72	91	66	82	74
6																	93	75	92	74	98	73.5	89	69
7																	93.5	76	96	76	99	77	85	74
8																	92	73.5	97.5	76.5	95	80	86.5	71
9																	93	74	82	72	97	77	82	74
10																	94.5	75.5	83	72	101	80	90	69
11																	92.5	74.5	85	66	100	80	89	68
12																	81	64	89	66.5	100	80	89	67
13																	83	58.5	91	69.5	101.5	80	90	67
14																	93	62	92	70.5	97	76	89	71
15																	86	60	89	70	91	72	80	67
16																	84	68	91	73	90	71	71	63
17																	85	68	92	73	90.5	69	80	65
18																	87	68	93	71	92	66	89	65
19																	90	70	94.5	72	93	67	69	65
20																	91	69	95	74.5	95	77	72.5	56
21																	91	70	95	78	88	74	75	53
22																	90.5	70.5	95	78	87.5	72	78	55
23																	89	72	95.5	79	91.5	74	83	63
24																	91.5	72	96	80	83.5	69	79	66
25																	91.5	71.5	96	79	91	68	83	70
26																	87	78.5	96	77	93.5	74	78	70
27																	94	77	93.5	78.5	94	78	73	62
28															*87	*71	95	76	83	71	86	76.5	68	52
29															84	70	88	75.5	82	66	89	74	73	52.5
30																	88	72	86	66	86	71	76.5	59
31																			91	67	85	69		
Range																	36°.5		31°.5		35°.5		38°	
Monthly means	56°		49°		44°		45°		45°		53°		55°		72°.4		81°		82°.8		82°.9		73°.2	

* Station supplied with maximum and minimum thermometers May 29, 1874.

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Maximum, minimum, and mean temperatures—Continued.

MILWAUKEE, WIS.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																	52	46	85	62	76	62	72	52
2																	56	44	66	57	65	58	87	64
3																	77	45	95	56	65	57	66	53
4																	71	52	87	59	67	54	64	52
5																	73	49	76	58	65	62	70	56
6																	65	49	90	67	67	62	85	58
7																	76	55	91	68	78	57	94	60
8																	82	56	81	64	82	60	89	70
9																	69	49	75	63	82	64	82	66
10																	52	41	84	64	82	65	83	67
11																	69	50	65	59	98	68	90	68
12																	63	47	67	54	85	76	88	69
13																	73	49	86	56	70	62	69	64
14																	66	52	95	68	68	61	84	57
15																	67	52	88	65	70	58	59	48
16																	71	58	67	57	79	57	61	53
17																	76	56	86	59	89	68	67	60
18																	87	65	90	65	73	61	71	60
19																	79	65	91	65	95	63	68	52
20																	85	66	66	57	80	66	64	45
21																	83	66	75	56	80	63	69	45
22																	94	69	77	56	64	62	74	54
23																	93	72	86	66	67	62	77	56
24																	79	65	79	68	67	53	79	56
25																	92	68	92	65	71	55	71	57
26																	79	62	84	67	72	56	79	66
27															*75	53	94	63	68	56	72	66	61	47
28															85	55	92	70	72	56	71	66	67	48
29															89	55	79	60	83	61	69	67	67	51
30															90	64	69	55	90	64	69	63	62	43
31															78	51			85	66	66	55		
Range																	50°		41°		45°		51°	
Monthly means	46°.4		30°.9		29°.6		23.°		26°.3		31°.2		36°.9		55°.8		66°.1		71°.5		68°.1		63°.6	

* Station supplied with maximum and minimum thermometers May 27, 1874.

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Maximum, minimum, and mean temperatures—Continued.

MOBILE, ALA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	84	65	68	40	66	56	63	47	68	58	73	63	65	56	73	54	91	70	86	76	96	76	91	77
2	81	70	70	42	69	63	66	52	62	56	68	50	63	48	77	65	90	77	88	74	96	76	89	76
3	82	67	65	59	71	66	67	50	55	48	67	46	69	45	80	69	89	75	77	72	95	78	89	75
4	85	68	74	59	57	52	71	57	60	40	76	63	70	50	74	63	92	71	75	72	93	75	89	75
5	87	67	74	64	56	50	62	45	62	41	76	63	70	56	66	55	89	74	85	72	95	75	90	75
6	76	57	71	63	66	59	45	37	62	52	75	63	77	65	70	50	88	70	96	71	94	76	90	75
7	66	48	71	61	72	64	49	33	52	46	69	55	75	62	78	54	90	71	91	73	94	79	90	77
8	72	47	74	56	71	62	50	32	57	42	65	51	76	64	79	56	92	76	91	71	94	77	89	74
9	76	51	72	49	71	60	65	45	60	41	69	44	70	53	79	60	93	75	84	72	98	80	88	73
10	80	56	72	51	73	61	61	41	56	36	68	49	64	42	79	61	93	76	81	72	97	74	91	72
11	81	58	74	55	73	59	66	47	60	37	69	54	69	44	85	61	93	77	77	69	85	82	87	73
12	76	62	65	46	74	62	67	55	66	53	64	46	73	48	86	63	90	75	89	71	97	79	87	68
13	74	52	55	36	68	45	67	56	66	60	65	43	73	59	75	65	89	72	88	74	100	79	90	69
14	79	53	60	38	52	34	62	39	72	60	57	43	77	67	84	66	89	74	90	74	97	77	88	70
15	79	62	65	46	60	41	43	31	66	55	66	43	77	67	84	69	87	74	90	70	98	79	86	71
16	80	62	70	46	65	47	42	32	71	60	70	62	71	60	86	70	85	72	93	72	93	71	89	71
17	80	63	70	46	68	51	55	38	72	60	71	63	70	60	85	64	86	75	94	73	81	72	88	72
18	81	61	62	44	64	49	53	45	62	47	76	66	67	64	84	64	87	72	91	75	77	72	90	75
19	72	54	46	36	60	49	66	48	68	43	75	66	73	64	79	62	86	72	92	75	86	73	88	72
20	63	44	49	30	56	39	67	55	69	59	76	67	78	62	82	60	87	72	94	75	90	75	82	74
21	67	44	61	43	53	39	65	57	75	64	76	67	81	59	86	71	85	70	92	75	92	75	84	65
22	75	55	64	51	64	46	67	59	75	65	82	68	79	67	88	68	79	72	93	76	90	79	87	64
23	72	66	69	51	53	47	66	55	67	46	69	49	83	65	90	66	86	73	93	76	90	77	87	64
24	70	63	72	58	49	45	60	48	51	44	63	48	65	54	88	72	91	72	91	77	90	74	88	72
25	74	60	66	47	45	38	56	36	53	45	68	48	68	51	88	68	90	75	93	77	90	74	85	76
26	78	65	59	46	51	33	58	43	60	38	69	57	77	53	88	69	88	77	95	79	92	74	79	74
27	73	58	63	49	50	35	65	50	71	47	73	59	78	62	88	70	91	71	93	80	89	75	83	70
28	58	43	66	52	44	28	65	53	72	50	75	64	75	56	90	70	91	71	89	79	90	75	78	60
29	52	34	65	47	52	30	60	42	.....	.....	73	57	66	48	91	71	89	72	93	76	93	77	77	54
30	58	34	67	48	48	38	63	38	.....	.....	75	58	71	45	90	77	92	77	94	74	86	78	79	55
31	68	43	.....	.....	53	31	67	44	.....	.....	78	66	.....	.....	88	70	.....	.....	94	73	93	74	.....	.....
Range	53°		38°		46°		40°		39°		39°		41°		41°		23°		27°		29°		37°	
Monthly means	65°.2		57°.7		54°.1		53°.3		56°.7		63°.3		64°.3		73°.6		80°.1		80°.8		83°.8		77°.9	

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Maximum, minimum, and mean temperatures—Continued.

MONTGOMERY, ALA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	78	59	66	35	69	46	61	37	64	56	61	56	66	54	78	51	95	73	87.5	73	95	73	87	72
2	78	64	70	35	73	58	68	51	62	47	65	51	57	42	81.5	58	94	75	88	74	93	73	87	72
3	81	57	70	35	73	58	70	50	55	45	72	47	67	42	83	64	89	73	80.5	73	90	73	88	68
4	85	62	65	58	71	46	77	53	57	36	80	63	73	46	74	58	91	72	83.5	72	94	72	86	73
5	(*)	.....	72	58	53	45	62	53	60	38	79	60	76	49.5	59	53	86	72	90.5	71.5	92	70.5	87	72.5
6	.....	.....	73	59	55	45	57	36	55	44	72	58	82	65	74.5	52	81	74.5	97	73.5	91	74.5	89	73
7	.....	.....	70	61	59	45	45	34	52	44	71	52	72	59	80	54	90	73	92.5	76	95	75	86	73
8	.....	.....	72	55	58	50	50	32	49	41.5	62.5	44.5	77	60.5	82.5	55	91	74	80.5	71.5	96	77	90	72.5
9	.....	.....	75	45	64	52	62	40	57.5	40.5	66	41.5	76	47	84.5	58	95.5	74.5	87	68	100	78	90	73
10	.....	.....	75	46	71	56	66	38	55	32	67	50	60	43	84	62.5	94	76.5	84	70	97.5	75	90	69.5
11	.....	.....	76	54	74	58	68	42	60	32	64	50	68	43	86	60	92	71.5	74	71	100	80	85	65.5
12	76	59	76	42	75	58	60	50	68	49	62	40	75	46	86	61	90	73	88	71	101.5	74	86	67
13	75	49	52	34	68	38	60	48	70	57	59	41.5	70	56	75.5	65.5	89.5	71	85.5	71	103	78.5	87	67
14	81	52	62	34	52	32	53	35	70	57	58	41	77	63	85	63.5	88	72	88.5	71	99.5	75	85	69
15	81	64	68	39	54	38	40	27	71	50	51	46	76	61	88	67	88.5	74	93	69.5	96	74.5	88	72
16	80	55	67	49	62	37	43	29	71	61.5	62	49.5	70	61.5	84	68.5	83.5	72.5	95	71.5	88.5	74	87	68
17	80	60	57	49	67	37	47	33	71	54	67	57	76	62	83.5	59.5	80	73	95	72.5	81	72	88	69.5
18	81	53	58	42	69	46	54	39	55	46	78.5	61	66.5	59	83	61	88	71	93.5	73.5	84	72	89	72
19	60	49	42	32	61	46	65	42	49	44	80.5	66.5	78.5	60	80.5	54	89.5	72.5	91.5	73	89.5	73	89.5	72
20	60	42	46	26	61	36	72	56	72	48.5	83.5	69	79	65	86	60	93.5	72	90.5	72	92	75	85	71
21	65	45	58	36	51	31	72	49	78	59	83.5	68	78	58	87	66.5	91.5	73.5	90	73	94	76	84	57.5
22	77	39	60	42	50	45	73	59	79	64	80	64	67	58.5	83	60	85	71.5	95	74	93	75	86	64
23	72	39	66	54	52	41	69	50	67	49	64	46	75	62	90	62	87	72.5	91.5	77	93	74	84.5	66
24	69	62	70	53	47	43	56	41	50	42	60	43.5	63	54	95	69.5	91.5	72	93	74.5	89	72.5	86.5	67.5
25	73	59	60	43	48	39	53	32	49	41	63	43.5	63	49	95	71.5	94	74	93	74	92.5	71	84	73
26	80	50	60	37	45	32	56	41	56.5	33	70	52	75.5	49.5	93	68.5	90.5	74	93	75.5	88.5	69.5	83.5	72.5
27	70	48	58	46	47	32	67	41	64	46	78	54	81	50.5	95	74	95	71.5	92	73	79.5	69.5	77.5	68.5
28	68	39	58	43	41	26	63	48	64	51	79	62	67	50	95	73.5	93	71	91.5	77	89	71	77	58
29	52	32	55	42	45	27	57	38	.....	.....	68	58	64	43	95.5	74.5	88.5	70.5	87	72	91	75	76	55
30	59	31	65	44	48	32	61	35	.....	.....	71	55	73	43.5	92	71.5	93	71	91	70	92	75	84	53
31	65	36	.....	.....	47	23	66	39	.....	.....	81	61	.....	.....	91	70	.....	.....	92	70	90	70.5	.....	.....
Range	.....	.....	50°		52°		50°		47°		43°.5		40°		44°.5		25°		29°		33°.5		37°	
Monthly mean	64.°4		54°.2		50°.2		51°.3		54°.5		61°		62°.4		73°.3		79°.7		79°.9		82°.6		76°.2	

* Observer sick.

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Maximum, minimum, and mean temperatures—Continued.

MONTREAL, CANADA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	63.7	42.6	46.2	33	.....	.....	.....	.....	1	10.5	42	18	25.2	0.4	39.9	31	59.7	47.8	77.3	57.3	72	61	76.4	57.7
2	65.6	42	44.2	35	.....	.....	.....	.....	—2.5	—18	46.8	32.5	42.9	9.2	45	30.9	67.6	47.3	68.6	54.6	65	54.2	77.2	60.2
3	54.7	39.8	44.8	41	.....	.....	.....	.....	16	— 4.6	48.4	35.3	36.4	20.6	63.1	40.2	70	51.7	64.1	58.7	62	53.5	70.2	51
4	56.7	39.7	55	22.5	.....	.....	.....	.....	21	3	45.7	15	21.4	6.3	61.7	43.5	65	54.9	72	59.5	73.4	54.1	68.2	48.5
5	64.2	46	47	27	.....	.....	.....	.....	5	—10.5	20.8	6.8	34.3	12.6	55.5	36.4	81.2	61.2	72.8	59.5	75.8	56.2	71	51.7
6	52.2	46	41.3	25	.....	.....	.....	.....	7	— 5.6	20.3	8.7	37.8	27.4	45.3	31.8	67	58.3	76	59.9	74	57.5	71.4	62.5
7	59.8	40	47	25.1	.....	.....	.....	.....	9	— 7.3	31.4	10	44.8	29.7	50.5	29.7	71.6	58	84.4	65.6	72.3	59	70	57.8
8	68.4	39.2	41.1	36	.....	.....	.....	.....	21	— 2	38	25	36.1	28.8	51.2	36.3	67.8	58.8	81.1	66.5	76.3	63.4	73.5	57.4
9	72.2	43.7	35.8	35	.....	.....	.....	.....	18	3	31	16	38	25.6	48.5	39.8	66.4	51.2	76.7	62.4	79.8	64	75.8	53.5
10	74.4	42.8	49.8	26.2	.....	.....	.....	.....	24	3	17.5	9	30.3	23.9	47.3	41.5	63.8	51.3	73.9	61.5	84	64	84.2	63.3
11	81.1	48.6	32.1	21.8	.....	.....	.....	.....	18	1	13.8	5.7	39.7	19.8	59.1	39.1	59	44.7	76	59.8	83.9	64.1	67.5	57.5
12	55.6	49	33.3	28.4	.....	.....	.....	.....	12	0	10.6	— 3	31.2	10.4	64.5	42.9	65.7	51.6	67.4	53.5	84	67.5	64.9	49.1
13	47.7	39.7	29.4	24.6	.....	.....	.....	.....	42	8	17	3	38.6	18.6	77.8	49.3	59.6	49.1	76.6	61.5	72.3	60.7	73.5	47.2
14	65.4	45.2	31.9	16.8	.....	.....	.....	.....	42	24	24	12	51.8	29.5	69.5	48.5	66.8	50.6	81.2	59.6	70.5	54.3	77.6	60
15	61.1	40.6	24.2	14.4	.....	.....	.....	.....	36	21	29.8	15.3	50.3	37.5	68	41.6	76	56	85.8	67.2	78.8	55.7	77	61
16	75	46.7	.....	.....	.....	.....	.....	.....	34.8	26.7	32.5	11.7	41.2	25	66	52.2	68.1	60.7	74	63.5	78.4	57.9	66.3	52.6
17	63.6	39.6	.....	.....	.....	.....	.....	.....	27	7	40.2	20	33	27	63.5	47.7	74.6	61.2	73.9	59.6	80.8	58.9	59.5	50.7
18	66.8	38.3	.....	.....	.....	.....	.....	.....	18	4	52	40	46.5	26.5	59	44.2	66	59.4	76.8	60.9	77	63.6	59.7	55.2
19	51.5	50.2	.....	.....	.....	.....	.....	.....	32	0.5	49	37.5	50.9	31	54	41	63.5	54.5	87	63.1	72.5	56.5	69.8	55.5
20	45	43.1	.....	.....	.....	.....	.....	.....	41	25	38.6	18.5	39.9	30	59	39.2	63.3	51.7	74.1	61.5	79.7	59.7	64.1	52.7
21	70.4	46.7	.....	.....	.....	.....	.....	.....	26	13.5	42.8	25.6	37	32	67.5	46.2	74.2	54	75	58.1	68	58.1	56.8	46.3
22	57.3	45.6	.....	.....	.....	.....	.....	.....	24.6	17.3	33.8	21.6	43.3	29.3	56	39.3	80.8	62	75.3	60.1	68.1	50.5	62.0	42.5
23	71.2	45.9	.....	.....	.....	.....	.....	.....	37.6	19.5	28.1	2.4	44.6	29.8	68.8	42.3	77.2	62.6	80.3	59	66.5	48.5	66.8	53.2
24	70	49	.....	.....	.....	.....	.....	.....	29.8	4.5	19.9	— 1.2	43	29.5	62.8	43.4	68	50.9	82.8	63.5	68.7	51.4	68.3	50.2
25	66.4	38.3	.....	.....	.....	.....	.....	.....	21.8	6	37.9	12.7	46.5	28.2	63.8	49.7	66.9	55.4	82.2	66.2	70.5	50.9	76.5	58.5
26	46	40	.....	.....	.....	.....	.....	.....	22.5	16.7	34.8	21.1	38	31	57.5	48.7	71.1	53.6	81.7	67.3	75.3	56	78.4	60.1
27	53	43.5	.....	.....	.....	.....	.....	.....	27.3	11.7	30.2	11	44.2	33.9	68.4	52	80.7	59	73.7	61	76	57	74.8	58.7
28	52	35.5	.....	.....	.....	.....	.....	.....	27.6	7	32.7	18.8	42.5	25	84	50.2	82	63.6	64	58.4	79.7	57	70.5	57.2
29	44	34.5	.....	.....	.....	.....	.....	.....	.....	.....	26	5.8	34.1	29	70	53.3	85	60.6	68.7	58.3	79.2	63	63.8	56.0
30	46.6	25.5	.....	.....	.....	.....	.....	.....	.....	.....	37.7	18.9	38.2	26.9	75	53	70.7	59.5	78.4	63	77.7	62.6	57.4	44.2
31	55.3	29.4	.....	.....	.....	.....	.....	.....	.....	.....	27	8.3	.....	.....	75.4	54.3	.....	.....	69	61.6	75	59	.....	.....
Range	55°.6		.....		.....		.....		60°		57°.8		51°.4		54°.3		40°.3		33°.5		35°.5		41°.7	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

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Maximum, minimum, and mean temperatures—Continued.

MORGANTOWN, W. VA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	84	37	56	23	44	31	43	28	34	22	56	25	45	31	42	23	76	58	87	58	76	68	80	51
2	68	39	51	29	62	42	51	39	41	27	60	29	47	34	52	44	79	48	87	66	75	62	83	52
3	79	38	58	23	70	51	65	49	36	29	64	35	49	36	60	41	69	60	80	58	72	53	84	56
4	67	44	61	35	69	37	73	49	33	25	61	30	42	22	52	44	86	65	94	58	74	55	77	63
5	76	44	49	29	38	30	49	31	33	27	53	26	59	23	60	43	87	66	77	66	76	51	85	64
6	56	39	52	30	35	24	48	34	38	26	58	38	53	39	58	36	89	68	85	56	77	62	84	66
7	44	35	54	40	42	31.5	53	41	42	28	62	42	58	42	57	32	90	69	94.5	62	77	61	84	59
8	64	35	57	40	61	40.5	42	32	33	21.5	42	31	67	42	75	40	91	74	97	70	75	62	89	61
9	69	35	50	31	61	38	50	31	39	20	38	25	46	36	81	56	92	71	94	66	80	58	79	60
10	73	43	59	33	46	35	45	31	39	22	44	28	43	33	84	51	89	69	84	71	80	59	81	53
11	74	47	54	37	62	35	41	31	47	35	38	27	60	27	85	51	84	68	76	54	87	59	84	55
12	55	33	43	31	64	54	32	22	62	34	34	22	41	20	86.5	55	74	64	80	66	92	69	89	59
13	57	33	30	18	58	34	36	20	62	52	27	17	70	26	85	56	68	52	82	63	85	66.5	90	62
14	68	40	35	17	39	29.5	29	19	62	34	36	24	72	53	81	56	76	48	88	61	76	63	87	61
15	75	40	55	34	46	32	19	10.5	60	30	53	21	65	48	85	55	86	56	89	65	76	56	75	67
16	74	44	56	34	49	28	20	6	49	36	52	41	48	36	78	59	78	67	80	64	80	52	69	67
17	75	51	44	32	52	24	32	−1	36	22	69	45	52	37	71	53	74	62	75	56	82	58	74	65
18	82	51	44	33	53	36	49	12	47	19	73	43	56	36	56	46	82	61	88	57	87	58	80	59
19	48	45	40	25	48	36	51	38	61	33	67	50	63	39	65	37	81	51	89	65	89.5	64	83	64
20	43	35	31	18	36	27	47	35	56	38	53	38	78	50	66	47	83	53	88	66	90	65	70	56
21	45	35	49	15	33	21	65	46	75	48	57	32	59	41	48	46	84	57	73	64	91	63	64	45
22	68	42	48	25	35	15.5	70	55	68	54	52	38	61	43	65	37	90	56	80	59	80	68	70	43
23	69	41	50	27	40	29	57	32	68	34	48	24	51	43	72	42	92	63	86	58	69	64	75	45
24	71	37	54	39	40	22	36	22	34	25.5	35	22	53	37	78	52	89	69	87	66	70	62	77	52
25	54	35	39	32	43	26	25	11.5	38	25	57	22.5	51	39	80	64	92	66	86	71	74	59	80	53
26	64	41	33	26	39	21	43	10	38	24	61	42	49	38	75	55	81	69	86	72	74	60	79	50.5
27	53	36	52	28	36	30	41	40	43	30	58	32	58	32.5	79	46	83	67	78	67	73	58	71	60
28	48	29	39	29	34	27	54	34	46	25	48	34	48	33	88	50	91.5	63	75	64	72	47	65	54
29	49	26	36	20	34	25	43	32	.....	.....	45	29	46	28.5	89	55	93	67	73	59	73	46	63	51
30	55	34	35	19	25	11	54	33	.....	.....	53	31	44	34	88	60	81	65	77	53	78	50	56	49
31	57	29	.....	.....	32	12	55	23	.....	.....	38	31	.....	.....	90	65	.....	.....	82	58	77	53	.....	.....
Range	58°		46°		59°		74°		56°		56°		58°		58°		45°		40°.5		46°		41°	
Monthly means	52°.2		38°.2		38°.7		38°.5		38°.9		42°.1		45°.7		63°		74°.2		74°.1		69°.5		66°.9	

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Maximum, minimum, and mean temperatures—Continued.

MOUNT WASHINGTON, N. H.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	30	18	34	11	− 2	−18	20	7	− 3	−17	24	3	13	−16	14	8	42	23	.....	31	.....	41	42	31
2	29	18	28	16	23	− 2	30	19	10	− 6	31	19	24	8	16	7	34	20	.....	40	.....	36	47	34
3	29	19	27	2	38	23	36	28	22	− 4	33	24	17	2	25	14	47	32	.....	39	.....	28	54	29
4	37	19	28	1	41	15	41	34	16	−10	36	7	15	4	26	22	48	35	.....	38	.....	30	46	25
5	43	34	21	− 1	15	− 2	41	5	− 8	−28	8	1	12	−18	23	15	56	45	.....	38	.....	36	53	41
6	39	32	7	0	2	1	30	15	1	−25	25	0	17	8	21	9	53	48	.....	40	.....	37	56	40
7	39	28	21	0	12	− 7	42	30	4	− 5	27	18	24	9	16	5	53	49	.....	43	.....	32	43	36
8	42	28	31	18	22	11	41	19	7	− 6	22	10	22	14	21	11	50	38	.....	46	.....	45	42	34
9	48	29	21	3	33	11	25	14	18	6	17	− 3	25	13	42	19	51	34	.....	43	.....	45	56	38
10	51	41	4	− 1	11	− 5	24	9	14	− 6	12	− 6	22	8	40	33	46	27	.....	46	.....	43	54	40
11	58	44	12	0	20	− 4	16	7	− 5	−16	25	4	14	0	84	19	43	25	.....	47	.....	49	49	35
12	51	29	30	12	20	14	7	−10	21	− 7	6	−15	0	−17	46	29	48	34	.....	47	.....	49	47	33
13	29	15	15	3	22	13	6	− 6	32	15	18	−11	25	− 6	47	38	35	26	.....	49	.....	47	53	36
14	31	19	7	− 5	22	− 2	7	− 2	32	1	15	0	42	24	43	31	39	29	.....	38	.....	46	61	48
15	33	21	19	− 7	19	−12	− 1	−20	20	2	28	−13	40	28	52	35	49	34	.....	49	.....	40	59	48
16	45	21	21	14	34	13	−20	−27	19	5	38	23	26	4	44	35	49	41	.....	44	.....	38	54	48
17	36	17	18	12	27	20	0	−25	6	−16	33	23	21	12	44	32	49	42	.....	38	.....	43	52	39
18	39	25	32	1	23	14	30	9	22	−16	39	30	21	10	40	33	45	38	.....	40	.....	40	42	36
19	44	35	10	− 2	21	13	29	16	23	13	39	25	23	11	37	24	40	33	.....	47	.....	35	50	41
20	47	42	9	1	16	−11	19	0	27	15	26	− 2	25	12	36	23	44	34	.....	46	.....	40	51	46
21	47	27	11	− 1	− 3	−18	25	5	36	15	21	− 2	26	8	31	25	46	40	.....	40	.....	38	46	24
22	31	21	14	3	10	− 6	40	22	32	25	17	4	12	3	28	23	53	43	.....	39	.....	29	39	23
23	43	27	18	4	15	6	40	4	37	12	8	−19	24	7	31	16	55	44	.....	40	.....	28	39	31
24	43	25	25	13	14	6	11	− 7	13	−13	−11	−31	20	6	40	28	48	27	.....	44	.....	28	44	33
25	38	14	22	− 2	18	3	11	−31	11	−11	18	−12	26	5	42	34	43	27	.....	46	.....	33	47	39
26	27	14	− 2	−20	22	5	−14	−43	9	− 7	25	13	14	8	38	32	50	32	.....	47	.....	35	55	42
27	41	19	11	−15	23	15	30	−15	6	−10	25	− 6	26	7	52	32	57	47	.....	50	.....	36	51	42
28	28	18	10	−15	18	− 7	37	3	5	−13	15	4	25	6	61	48	61	46	.....	49	.....	39	54	40
29	24	12	− 6	−12	12	− 1	7	− 9	.....	.....	5	−13	29	14	56	48	(*)	52	.....	42	53	43	50	43
30	24	8	− 7	−22	5	−18	7	−31	.....	.....	15	2	16	2	51	47	.....	38	.....	40	49	43	44	23
31	36	8	.....	.....	9	− 5	4	−12	.....	.....	10	−15	.....	.....	59	41	.....	.....	.....	40	50	39	.....	.....
Range	50°		56°		59°		85°		65°		70°		60°		56°		.....		.....		.....		38°	
Monthly means	32°.1		8°.6		10°.7		11°.2		6°.3		12°.8		14° 2		32°.5		42°.9		48°.5		43°.9		43°.4	

* Maximum thermometer broken.

Digitized by Google

Maximum, minimum, and mean temperatures—Continued.

NASHVILLE, TENN.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																	*91	*72	94	74	93	74	84	67
2																	89	70	94	74	88	72	87	70
3																	91	72	94	70	90	69	86	67
4																	91	70	97	70	89	68	83	65
5																	90	70	98	77	87	67	83	72
6																	91	73	100	78	81	72	86	67
7																	94	74	101	73	91	72	86	70
8																	96	78	101	78	92	76	88	67
9																	95	74	95	75	91	69	90	67
10																	94	75	92	73	102	76	91	68
11																	95	77	82	70	104	79	86	67
12																	81	67	86	68	102	73	88	64
13																	82	60	92	71	106	78	87	67
14																	92	60	93	74	96	77	88	71
15																	86	72	93	75	91	72	86	70
16																	83	70	90	75	87	70	76	67
17																	87	63	90	70	90	68	80	69
18																	88	66	91	72	92	67	87	67
19																	92	66	93	71	94	69	78	65
20																	93	72	94	75	95	75	72	53
21																	94	67	95	73	87	78	75	50
22																	93	71	88	74	92	75	78	57
23																	93	73	84	74	92	73	74	62
24																	96	76	96	77	87	73	80	64
25																	93	74	96	77	87	67	85	65
26																	96	72	97	79	81	66	76	66
27																	98	78	88	76	75	69	74	58
28																	99	82	82	70	76	68	65	52
29																	95	80	84	65	87	67	71	49
30																	94	72	86	62	80	68	74	52
31																			92	64	84	66		
Range																	39°		39°		40°		42°	
Monthly means	56°.8		47°.1		44°.6		42°.3		44°.5		51°.7		54°.7		72°		83°.5		83°.4		81°.5		73°.4	

*Station supplied with maximum and minimum thermometers June 1, 1874.

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Maximum, minimum, and mean temperatures—Continued.

NEW HAVEN, CONN.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	60	38	46.5	36	22	11	43	24	16	5	46	23	36	20	57	37	72	53	78	58	82	64	76	61
2	62	45	53	31.5	28	10	43	35	14	−3	59	30	43	26	54	38	63	49	77	62	79	62	81	60
3	63	44	56	36	48	28	44	35	32	11	53	30	49	34	59	36	65	52	78	63	70	56	84	60
4	66	47	49	27	59	48	52	41	33	23	60	34	40	20	65	41	67	54	76	57	71	57	67	52
5	72	59	53	33.5	49	31	52	30	25	12	42	26	40	16	58	47	72	57	68	61	75	(*)	70	52
6	72	53	46	30	35.5	27	34	29	23	5	36	26	55	33	61	40	71	56	72	59	77	.....	76	66
7	53	42	49	27	32	21	51	31	24	11	33	28	46	33	51	37	77	63	75	59	80	.....	75	60
8	63	38	56	41	41	22	52	40	29	12	43	31	51	32	58	36	85	62	83	66	76	65	78	56
9	60	43	49	38	49	40	45	32	30	10	33	23	45	37	76	42	80	63	84	70	70	63	73	58
10	63	38	38	27	43	32	48	25	30	23	27	16	43	33	70	40	80	64	82	67	82	63	80	58
11	67	40	40.5	28	43	32	45	32	35	17	30	20.5	55	26	56	44	67	57	83	70	81	64	85	64
12	63	42	45	37	49	40	32.5	27	33	14	29	16	32	19	59	34	75	56	81	71	79	69	74	62
13	53	41	41	29	45	37	35	21	48	29	26	15	44	21	72	44	67	52	82	70	81	70	69	59
14	67	40	31	23	37	26	28	24	49	33	36	19	57	33	78	55	75	49	85	63	72	62	72	56
15	66	43	38	21	43	32	25	15	41	25	41	21	59	43	65	51	79	56	88	68	76	61	74	66
16	64	40	33	29	47	30	21	10	42	29	44	27	57	40	58	48	75	62	88	66	76	56	74	64
17	62	48	37	28	39	30	26	7	34	18	47	32	45	30	68	47	76	64	78	61	73	58	68	62
18	60	40	37	30	42	28	34	11	37	14	56	43	47	29	59	50	72	62	88	61	83	52	65	58
19	69	59	37	28	42	30	43	23	40	16	56	43	55	36	66	45	69	54	81	69	78	59	66	57
20	66	63	32	20	42	31	38	20	50	39	56	33	46	38	65	48	65	52	82	68	87	61	68	56
21	66	47	35	20	31	17	37	19	47	39	50	29	49	35	60	50	71	57	78	67	85	73	65	53
22	60	41	40	23	31	19	47	36	42.5	37	48	38	52	36	66	48	80	60	79	61	76	60	63	45
23	62	39	40	21	28	21	58	39	60	36	41	21	45	36	69	45	91	66	81	59	69	50	62	46
24	65	50	45.5	35	40	23	38	28	47	26	30	10	54	34	68	50	76	63	81	65	71	54	71	50
25	56	40	37	26	40	29	32	15	26	22	49	22	43	33	63	55	81	55	78	59	70	56	74	57
26	55	32	26	20	34	29	25	7.5	35	19	55	38	45	33	68	53	77	63	79	63	69	50	76	56
27	62	47	28	17	30	26	39	25	38	25	47	30	51	37	71	47	74	61	80	70	71	49	65	55
28	65	40	31	16	38	28	46	31	40	20	43	32	45	34	73	53	86	61	80	62	72	52	67	49
29	47	34	34	17	38	26	37	26	.....	.....	40	30	39	33	76	56	89	69	78	68	72	51	65	60
30	47	30	30	18	31	15	35	14	.....	.....	54	28	51	32	73	55	85	63	80	62	73	51	64	51
31	44	35	.....	.....	35	14	19	9	.....	.....	38	30	.....	.....	71	56	.....	.....	80	58	77	54	.....	.....
Range	40°		40°		39°		51°		63°		50°		43°		44°		42°		31°		.....		40°	
Monthly means	52°.7		34°		32°.6		32°.1		28°.3		35°		39°.8		56°.8		67°.4		72°.2		67°.9		64°.8	

* Minimum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

NEW LONDON, CONN.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1													32	21	56	41	69	54	78	60	80	66	76.5	62
2													40	38	50	39	59	52	70	61	78	64	80	57
3													48	31	65	37	60	50	76	61	72	58	82	61
4													41	20	63	42	67	53	68	58	72	54	70	55
5													37	19	56	47	67	55	67	60	77	56	64	49
6													56	33	61	43	72	57	71	56	77	60	70	61
7													45	35	55	41	69	59	71	55	79	62	75	58
8													43	35	55	39	84	59	77	63	70	65	79	56
9													50	35	70	44	76	66	83	67	77	65	74	57
10													44	34.5	82	41	75.5	60	76	64	81.5	62	78	58
11													51	32	55	42	69.5	56	81	68	79	64	86	63
12													39	27	53	36	69	54	76	67	76	67	72	62
13													49	24	70	44	69	53	78	66	79	69	65	56
14													53	36	75	54	71.5	49	82	63	70	60	68	52
15													57	45	60	50	77	57	87	67	76	60	70	55
16													57	44	58	47	69.5	58	85	70	76	59	70	64
17													45	32	66	52	71.5	62	80	63	72	58	68	62
18													52	32	61	49	71	59	82	61	79	57	63	57
19													52	36	64	48	71	52	80	66	78	61	67	58
20													49	39	60	45	62	51.5	79	66	83	66	67	58
21													55	36	56	49	67	55	79	67	85	72	68	54
22													53.5	35	65	49	76	56	80.5	60	74	62	64	47
23													45	39	66	46.5	85	63	79	61	67	52	69.5	45.5
24													55	37.5	66	50	76	64	80	64	71	56	71	51
25													45	34	60	52	68	63	74	60	69	52.5	75	57
26											*53	*39	45	34	70	50	70	62	75	65	70	51	76	56
27											50	34	56	38	67	53	75	61	75	66	72	48	66.5	54.5
28											50.5	33	49	35	67	53	80	67	74	62	73	51	67	50
29											42	32	41	34	67	54	84	69	75	67	73	51	67	60
30											49	30	50	33	67	55	85	65	80	64	74	52.5	66	53
31											41	31			71	55			78	60	74	55		
Range													38°		45°		36°		32°		34°		40°.5	
Monthly means	52°.7		34°.6		34°.2		33°.4		29°.5		34° 6		39°.7		55°.5		65°.5		70°.9		67°.7		64°.5	

*Station supplied with maximum and minimum thermometers March 26, 1874.

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Maximum, minimum, and mean temperatures—Continued.

NEW ORLEANS, LA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	62	66	56	72	59	90	76	90	78	90	78	87	77.5
2	.....	.....	.....	.....	.....	.....	.....	.....	*62	*54	69	55	61	50	78	63	88	77	87	78	91	78	85	75
3	.....	.....	.....	.....	.....	.....	.....	.....	55	48	75	54	66	53	82.5	72	88	76	81	74	93	79	85	77
4	.....	.....	.....	.....	.....	.....	.....	.....	57	45	79	68	69	51	75	64	88	75	76	73	93	80	80	75
5	.....	.....	.....	.....	.....	.....	.....	.....	59	46	78	67	69	59.5	69	58	90.5	75	83	73	94	80	86	76
6	.....	.....	.....	.....	.....	.....	.....	.....	66	52	78	66	76.5	68	70.5	58	89	76	86	75	93	81	86	78
7	.....	.....	.....	.....	.....	.....	.....	.....	54	48	71	61	79	62	75	59	89	77	89	78	92	80	85	79
8	.....	.....	.....	.....	.....	.....	.....	.....	57	44	64	53	77	66	77	61	89	72	89	78	91	79.5	87	78
9	.....	.....	.....	.....	.....	.....	.....	.....	58	46	68	51	70	53	78	62	88	78	81	74	94	80	83	78
10	.....	.....	.....	.....	.....	.....	.....	.....	57	42	74	56	62	48	79	63	88	78	85	74	96	80	87	76
11	.....	.....	.....	.....	.....	.....	.....	.....	65	43	69	57	64	48	79	62	88	78	79	72	94	82	88	70
12	.....	.....	.....	.....	.....	.....	.....	.....	70	51	64	51	68	52.5	83	66	89	79	87	73	93	82	85	75
13	.....	.....	.....	.....	.....	.....	.....	.....	72	63	65	50	74	58.5	83	68	86	74	85	76	96	81	84	75
14	.....	.....	.....	.....	.....	.....	.....	.....	68	61	61	52	77	65	82	70	86	76	85	73	95	81	82	73
15	.....	.....	.....	.....	.....	.....	.....	.....	70	57	72	61	78	68	85	71	85	74	85	75	96	81	85	74
16	.....	.....	.....	.....	.....	.....	.....	.....	71	62	74	68	73	60	83	70	84	73	85	74	91.5	75	85	75
17	.....	.....	.....	.....	.....	.....	.....	.....	75	64	75	68	66	62	83	72	83	73	86	75	85	76	87	75
18	.....	.....	.....	.....	.....	.....	.....	.....	62	51	78	69	74	65	85	68	84.5	75	85	76	82	76	88	78
19	.....	.....	.....	.....	.....	.....	.....	.....	73	51	78	68	74	66	81	70	85	75	86	76	82	76	86	77
20	.....	.....	.....	.....	.....	.....	.....	.....	75	66	78	69	76	62	85	69	85	73	88	76	85	76	86	77
21	.....	.....	.....	.....	.....	.....	.....	.....	76	68	79	68.5	75	64	90	73	83.5	75	88	77	86	78	84	72
22	.....	.....	.....	.....	.....	.....	.....	.....	76	67	81	70	78	68.5	88	72	85	75	88	76	84	77	86	74
23	.....	.....	.....	.....	.....	.....	.....	.....	71	49	73	51	76	67.5	89	74	86.5	75	86	78	86	77	85	76.5
24	.....	.....	.....	.....	.....	.....	.....	.....	53	45	65	52	68	56	88	74	87	77.5	87	78	86	77	86	75
25	.....	.....	.....	.....	.....	.....	.....	.....	55	46	65	51	67	52.5	85	69	86	79	90	78	89	78	83	76
26	.....	.....	.....	.....	.....	.....	.....	.....	55	45	71	59.5	77	59	85	73	89	78	90	77	91.5	78	83	75.5
27	.....	.....	.....	.....	.....	.....	.....	.....	66	44	77	60	76	62	85	75	90	78	91	77	90	78	85	73.5
28	.....	.....	.....	.....	.....	.....	.....	.....	77	48	76	65	77	63	85	74	89	77.5	93	80	88	77	85	68
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73.5	61	65	52	86	74	90	78	91	78	89	78	74	63
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	62	71	56	89	74	91	79	91	79	83	72	79	66
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	63	.....	.....	88	76	.....	.....	91	79	88	75	.....	.....
Range	.....		.....		.....		.....		.....		31°		31°		32°		19°		21°		24°		25°	
Monthly means	68°.2		61°.2		56°.6		56°		59°.1		66°.2		65°.6		75°.7		81°.3		81°.4		83°.9		78.9	

* Station supplied with maximum and minimum thermometers February 2, 1874.

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Maximum, minimum, and mean temperatures—Continued.

NEW YORK, N. Y.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	61	48	49	33	29	17	40	29	22	9	45	26	34	23	60	40	74	57	78	68	85	67	82	64
2	54	43	56	34	38	16	42	35	23	4	54	21	45	29	57.5	40	66	50	76	66	80	65	85	64
3	69	54	58	36	49	31	47	38	32	17	57	39	47	35	65	36	60	53	79	63	75	58	86	64
4	69	58	51	33	64	47	58	42	35	24	63	36	42	21	58	47	66	57	78	63	75	56	68	57
5	71	60	55	40	49	33	47	32	32	19	54	31	38	20	65	45	73	62	71	63	77	60	72	61
6	70	50	50	35	43	29	31	31	25	15	38	26	58	35	58	44.5	75	61.5	74	61	80	62	76	61
7	52	43	52	30	37	20	58	39	24	13	36	28	48	37	55	40	79	64	78	61	78	64	82	64
8	68	44	54	45	41	30	55	32	32	14	37	28	52	39	70	42	88	66	87	66	73	65	80	62
9	60	51	53	39	48	38	47	31	32	11	41	25	45	37	76.5	52.5	79	69	85	72	75	64	77	64
10	66	51	41	30	46	35	46	31	33	22	41	21	45	35	86	60	83	70	88	69	84	66	87	60
11	69	50	43	29	43	32	42	32	32	20	36	24	54.5	26	60	44	74	59	85	69	83	70	88	68
12	64	49	49	39	59	40	38	26	36	22	35	21	39	22	55	41	79	58	82	68	81.5	68	74	62
13	60	44	49	22	48	35	33	24	48	30	35	15	40	25	72	41	70	60	81	68	84	68	70	60
14	68	44	38	22	39	26	32	24	48	37	40	21	60.5	32	75	55	67	52	86	68	72	66	72	64
15	68	51	41	27	48	32	24	13	20	28	44	21	61	49.5	68	48	76	51	90	68	78	63	75	64
16	68	52	49	36	51	33	25	9	48	30	42	31	58	40	67	47	76	56	88	69	78	65	71	68
17	66	54	43	31	50	29	29	13	38	19	49	33	50	33	68	55	78	65	91	64	77	64	68	65
18	62	51	40	31	52	35	35	14	32	17	52	42	47.5	32.5	58	52	78	65	84	65	87	61	69	62
19	70	60	39	30	50	35	40	29	43	24	61	49	50	36	68	46	72	59	82	68	80	65	68	60
20	70	54	35	20	44	33	38	25	44	35	60	40	45	40	64	31	65	52	86	66	90	65	67	61
21	59	49	35	20	35	24	40	25	53	39	60	35	55	40	62	50	78	58	77	71	90	74	68	54
22	70	47	47	27	33	22	58	36	46	39	50	39	50	38	68	48	81	62	81	65	79	62	85	64
23	66	47	41	30	34	26	62	40	69	34	43	23	47	40	68	49	88	67	81.5	65	69	53	86	64
24	64	(*)	50	30	43	25	42	.....	51	31	33	17	56	39	63	53	81	68	80	63	71	63	73	57
25	72	43	44	30	41	32	28	17	31	22	47	24	48	35	64	54	87	60	78	64	70	61	75	59
26	55	41	32	22	36	32	26	12	36	21	58	40	45	33	66	54	85	66	77	67	70	58	79	61
27	64	50	39	25	39	30	42	24	40	23	52	32	55	38	74	52	84	64	79	68	70	57	70	61
28	56	40	36	21	40	29	50	.....	38.5	23	49	34	45	34	74	55	84	64	79	68	73	59	67	55
29	52	38	36	24	38	20	38	28	.....	.....	44	31	41	32	75	57	93	70	73	69	73	58	63	55
30	58	36	34	25	32	17	38	19	.....	.....	52	31	51	32	74	59	85	70	82	63	75	57	63	50
31	49	40	.....	.....	33	17	28	15	.....	.....	43	30	.....	.....	75	55	.....	.....	82	63	77	61	.....	.....
Range	37°		38°		47°		53		60°		48°		41°		55°		43°		30°		37°		38°	
Monthly means	55°.6		37°.9		36°.9		34°.7		31°.5		38°.3		41°.6		58°.6		70°.4		73°.9		70°.8		67°.2	

* Minimum thermometer out of order.

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Maximum, minimum, and mean temperatures—Continued.

NORFOLK, VA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	50	29	43	31.5	53	38	43	39	79	51	86	68	95	72	92.5	67.5	79	60
2	.....	.....	.....	.....	.....	.....	60	48	44	32	52	42.5	44.5	39	67	52	66	55	84	69	84	73	81	64
3	.....	.....	.....	.....	.....	.....	67	42	39	32	70	44.5	59	37	56	44	69	58	83	72	79.5	67	88	63
4	.....	.....	.....	.....	.....	.....	70	49	41	31	70	47	62.5	39	61	43	87	57	91	69	79	66	83	66
5	.....	.....	.....	.....	.....	.....	68	42	38	29	47	39	47	33	57	47	89	72	88	72	75	65	82	61
6	.....	.....	.....	.....	.....	.....	61	42	45	33	53	43	80	51	62.5	47.5	89	72	72	63.5	79	65	82	66
7	.....	.....	.....	.....	.....	.....	65	52	45	30	69	46	72	50	61	49	93	71.5	83	63	84.5	65	82	66
8	.....	.....	.....	.....	.....	.....	55	40	34	29	57	39	55	45	78	47	99	75	92	68	81	66	86	66
9	.....	.....	.....	.....	.....	.....	55	34	34	31	48	37.5	57	44	85	45	102	77	93	67	84	66	76	66
10	.....	.....	.....	.....	.....	.....	55.5	40.5	41	29	55	37	61	42	89	62.5	99.5	73.5	94.5	69	90	66	73.5	66
11	.....	.....	.....	.....	*55	50	56	40	51	35	50	38	61	38	81	51	92	72	93	74	82	70.5	82	62
12	.....	.....	.....	.....	71	50	44	34	59	35	48	33	51	32	58	50.5	92	69	91	72	86	70	88	66
13	.....	.....	.....	.....	73	40	42	36	65	46	38	28	56	32	77	51	86.5	66.5	87.5	72	85	73	81.5	68
14	.....	.....	.....	.....	45	35	43	32	62	43	44	28	69.5	40	77.5	51.5	74.5	62	90	71	79	70	78	68.5
15	.....	.....	.....	.....	51.5	35	28.5	22	47	39.5	45.5	30	77	59	69	61	76	62	96	72	77	68	82	71
16	.....	.....	.....	.....	56.5	40	26	15	64	40.5	51	38	63.5	41.5	82.5	61	89	63	95	65	76	66	81	71.5
17	.....	.....	.....	.....	60	48	30.5	20	47	36	57	50	55	44	70	60	87	72	80	70	76	67	78	68.5
18	.....	.....	.....	.....	62	45	48.5	28	37.5	30	73	51	49	42	69	60	90	69	83	67	84	66	80	68
19	.....	.....	.....	.....	59	40	53.5	38	54.5	34	78	60.5	57	44	69	51	80	69	84	65.5	91.5	67	81	69
20	.....	.....	.....	.....	49	39	57	34	64	42	70	43	77	55	78.5	53.5	76	64	92	67	94	73	80.5	64
21	.....	.....	.....	.....	41	35	53	42.5	73	46	59	39.5	70	52	68	54	80	62	93	72	96.5	74	69	61.5
22	.....	.....	.....	.....	41	32	70	45.5	75	54	63	47	60	46	69	51.5	92	63	78	67	89	73	70	58
23	.....	.....	.....	.....	41.5	33	73	47.5	77	62	58	39	68	50	79	55	97	68	79	62	79	71	71.5	57
24	.....	.....	.....	.....	40	30	51	37	70	34	42	28	54	46	79	55	95	73.5	79	64	73	66	73	58
25	.....	.....	.....	.....	41	32	34.5	26.5	40	33	56.5	31	69	45	91	61	95	71	86	65	73	65	77	59
26	.....	.....	.....	.....	41	32	37.5	23	42	32	58	48	59	46	81.5	66	95	71	91	69	73	63	77.5	58
27	.....	.....	.....	.....	42	35	50.5	32	49	34	52	49	63	44	69	59	89	73	88	71	69	61	80	60.5
28	.....	.....	.....	.....	44	33	60.5	32	46	36	60	46	76	49.5	82.5	56	93	73.5	82	69	70	60	75	61
29	.....	.....	.....	.....	50	31	52.5	36	.....	.....	51.5	41	63	38	82	62	95	75	85	69	72	60	69	60
30	.....	.....	.....	.....	32.5	24	55	34	.....	.....	65	39	64	36.5	74.5	61	91	71	86	67	73	58.5	69	54
31	.....	.....	.....	.....	40.5	20	60	40	.....	.....	58	42	.....	.....	81	60	.....	.....	86	64	68	58	.....	.....
Range	.....		.....		.....		59°		48°		50°		48°		48°		47°		34°		38°.5		34°	
Monthly means	57°.6		47°.2		44°.5		45°.2		43°.1		48°.9		52°.2		64°.1		77°.7		76°.9		73°.2		70°.4	

* Station supplied with maximum and minimum thermometers December 11, 1873.

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Maximum, minimum, and mean temperatures—Continued.

OMAHA, NEBR.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	68	39	49	22	44	32	44	29	25	16	49	26	45	21	80	59	76	59	90	65	81	62	90	65
2	73	52	55	31	39	14	47	30	29	12	52	35	44	28	66	53	80	62	92	66	81	60	64	56
3	62	52	59	26	10	7	47	6	29	18	40	22	50	32	53	39	82	60	94	68	90	64	58	49
4	70	49	51	31	22	3	17	−2	26	9	42	18	38	22	59	40	78	60	96	72	89	65	63	52
5	58	34	47	23	21	5	32	7	31	16	45	35	40	26	66	43	79	62	97	69	95	75	84	52
6	51	25	59	32	27	16	39	12	30	19	39	28	44	29	73	43	81	64	92	69	82	70	92	56
7	70	38	58	41	35	24	42	19	34	5	29	15	47	24	83	50	88	61	99	76	86	68	91	68
8	74	48	70	34	37	15	42	25	37	22	29	10	46	31	89	61	85	69	102	74	86	68	84	66
9	86	56	69	39	26	10	43	28	33	7	41	16	50	24	79	63	74	55	92	72	94	70	78	71
10	68	45	62	36	36	12	36	17	39	17	32	19	69	34	76	58	80	56	84	66	105	74	78	70
11	66	41	55	34	36	25	27	13	40	18	32	12	68	44	76	45	64	48	84	61	93	75	85	66
12	68	37	36	25	27	8	32	18	34	13	27	11	65	36	73	48	75	48	84	67	88	69	68	55
13	72	55	46	20	31	5	28	−3	27	7	37	11	57	48	65	50	65	58	92	69	89	69	69	52
14	81	51	36	23	36	13	5	−4	44	18	40	37	57	41	73	58	75	59	100	77	80	71	65	45
15	71	45	64	36	42	20	16	−7	41	15	46	38	51	30	66	50	76	56	85	67	88	69	62	36
16	65	52	52	40	41	24	33	12	44	55	47	41	51	35	76	43	84	56	85	57	92	70	67	45
17	63	44	59	35	38	18	36	30	42	24	52	40	59	31	68	52	85	60	92	70	84	69	68	56
18	48	35	36	18	34	21	39	13	37	28	40	34	66	37	75	47	87	68	97	69	91	66	62	48
19	60	31	32	11	28	10	22	5	38	17	44	30	48	32	82	57	89	70	85	75	97	75	62	44
20	59	33	47	23	14	2	34	22	39	12	57	34	56	32	75	55	81	63	80	62	92	71	60	41
21	63	40	49	24	35	6	35	12	34	4	43	30	45	35	69	54	89	68	79	65	94	73	68	52
22	47	28	46	33	40	34	13	5	14	5	45	29	52	34	78	51	88	70	89	69	70	65	72	51
23	52	23	40	31	36	32	15	−3	9	1	52	19	42	29	89	59	91	69	96	71	80	64	75	53
24	45	27	53	28	34	26	24	−9	11	−6	49	21	64	37	88	70	88	70	103	77	80	64	75	55
25	44	36	40	25	38	26	33	6	23	−1	54	33	59	41	84	58	92	82	105	77	84	64	74	62
26	39	25	56	23	39	18	42	22	28	12	29	20	61	40	89	60	90	72	80	62	84	65	68	56
27	37	24	27	13	18	5	38	18	41	12	39	21	54	42	90	68	93	74	73	57	86	73	65	47
28	31	18	31	10	37	11	42	13	45	27	40	23	57	40	87	69	76	64	87	58	87	72	74	42
29	51	22	44	22	29	13	41	22	.....	.....	44	26	72	41	84	70	85	57	95	66	84	67	76	50
30	44	23	49	28	35	13	22	6	.....	.....	45	32	85	51	87	66	86	66	97	73	81	57	71	44
31	41	17	.....	.....	42	26	22	5	.....	.....	37	23	.....	.....	87	64	.....	.....	100	73	83	55	.....	.....
Range	69°		60°		42°		56°		51°		47°		64°		50°		45°		48°		50°		56°	
Monthly means	48°.5		38°.5		25°.2		22°.3		23°.4		33°.8		45°.1		66°.6		73°.2		80°		77°.3		63°	

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Maximum, minimum, and mean temperatures—Continued.

OSWEGO, N. Y.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	60	42	45.5	31	24	14	43	35	13	1	47	25	41	22.5	47	37	55	48	79	53	74	65	73	55.8
2	56	44	52	35	41	19	42	35	17	0	56	37.5	44	32	46	33	65	47	72	59	69	61	78	62
3	52	44	50	35	51	39	52	42	29	16	59	41	39	26	53.5	38	70	57	76	57	67	52	77	52
4	63	50	55	32	62	37	64	39	25	20	64	27	27	13	52	40	77	58	67	59	70	51	65	46.9
5	61	53	44	32	38	30	40	24	24	8	27	19	40	26	57	41	83	62	72	58	77	52	79	54
6	57	43	36	31	33.5	30	39	26	20	7	47	25	40	32.5	50	32	75	54	86	60	78	54	75	61.5
7	59	51	49	31	33	26.5	39	34	24	9	40	31	42	34	51	36	86	59	89	68	79	64.5	75	61.5
8	59	43	47	41.5	39	26.5	50	34	27	7	39	28	46	34	59	45	71	55	80	67.5	75	65	76	57
9	59	44	43	31	47	39	45	31	32.5	13	31	16	35.5	31	77	50	81	55	77	62	79.5	63.5	79	55
10	69	46	33	27.5	40	33	41	33	30	21	24	14	40	30	71	45	69	54	77	65.5	77	62	78	57.7
11	70	50	49	32	44	35	36	28	26	20	24	18	36	24	69	44	62	55	73	64	85.5	63	80	65.3
12	55	43	45	31	42	32	30	23	40	12	22	12	34	21	78	52	66	51	68.5	60	93	71.5	73	64.6
13	54	42	31	25.5	34	21	30	24	48	35	22	10	46	25	74	53	59	47	75	58	72	65.5	81	62
14	59	50	31	24	35	24	32	21	46	25	31	20.5	61	41	61	46	75	51	86	60	76	61.5	86	64
15	59	42	35	28	40	32	21	8	43	24	32	22	53.5	36	83	50	72	58	89	70	73.5	58	83	66.5
16	74	50	51	30	45	30	19	7	40	28	44	26	38	32	76	48	75	59	79	60	77	56.5	67	58.3
17	56	44	34.5	30	44	31	24	11	28	16	50	34	40	32	63	45	72	52	74	56	85	62	70	59
18	64	53	34	29	44	37	36	20	25	12	59	44	50	33	55	43	58	51	84	59	75	68	71	59.4
19	55	44	31	28	42	27	44	25	40	21	60	32	50	33	62	43	67	53	88	65	76	60.5	75	59.4
20	46	41	34	23	36	22	26	13	40	35	37	32	51	43	58	46	63	53	79	61.5	78	67.8	67	56
21	54	46	32.5	25	33	23	40	23	43	29	50	33	48	32	47	43	69	51	71	59	74	60.5	61	49.5
22	57	45	38	28	32	23	55	40	32	29	42	29	52	37	54	44	85	55	82	55	67	50	68	45
23	66	48	41	30	35	22	54	28	46.5	31.5	30	15	48	38	69	46	93	62	88	57	67	50.7	67	52
24	50	41	41	27	38	21	39	18	32	16	27.5	15	43	34	69	55	68	55	86	67.5	73	53	72	55
25	48	39	30	19	36	29	19	8	32	20	51	21	47	33	72	52	68	54	90	69.5	72	51	77.5	55
26	55	37	23	13	40	33	21	0	29.5	22	47	28	43	32	52	45	65	57	85	70.5	74	54	79	56
27	54	44	28	17	40	33	45	21	32	24	37	25	41	35	72	48	79	54	78	62.5	73	54.6	80	61
28	53	37	27	19	34	24	40	20	36.5	26	36	27	38	34	86	56	94	62	65	58.5	76	56	69	59
29	42	30	31	24	36	25	36	13	.....	.....	37	20	39	32	70	52	84	64	71	58.5	72	57.8	60	56
30	46	34	30	14	28	13	15	0	.....	.....	38	25	42	34	83	54	69	56	76	61	75	58.5	58	45.5
31	50	32	.....	.....	36	26	15	7	.....	.....	31	23	.....	.....	83	54	.....	.....	75	61.5	75.5	58	.....	.....
Range	44°		42°		49°		64°		48°		49°		48°		53°		47°		37°		43°		41°	
Monthly means	50°.9		32°.3		33°.3		28°.7		25°.9		32°.5		36°.7		53°.7		62°.1		69°.8		67°.5		65°.4	

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Maximum, minimum, and mean temperatures—Continued.

OTTAWA, CANADA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	36.7	22.2	0.1	—16.9	44.7	12.9	31.2	0.5	43.2	31.2	62.7	45.8	84.7	55.6	77.7	61	81.7	53
2	.....	.....	.....	.....	.....	.....	31.7	16.5	3.5	—22.9	45.7	23.7	41.9	13.1	48.7	30.7	71.5	43.8	80.7	58	69.9	55	85.7	53.4
3	.....	.....	.....	.....	.....	.....	40.7	29.4	17.6	0.5	49.7	35.7	36.7	16.8	64.7	30.7	72.7	47.8	72.7	58	67.7	48.6	69.7	46.8
4	.....	.....	.....	.....	.....	.....	59.5	39.2	19.6	3.3	35.7	10.1	21.7	4.7	65.1	30.7	71.7	56	78.7	53	79.5	50.6	68.7	41.4
5	.....	.....	.....	.....	.....	.....	22.7	12.9	8.6	—12.4	22.7	4.7	37.7	9.9	57.9	33.7	82.7	54	84.7	61	83.7	49.8	75.1	45.6
6	.....	.....	.....	.....	.....	.....	27	12.1	7.6	—16.9	25.7	5.7	42.7	25.4	42.7	29.4	74.7	58	79.7	59	82.7	52.6	74.9	62
7	.....	.....	.....	.....	.....	.....	34.2	27.4	12.6	0.1	27.7	20.2	43.7	25.4	54.9	25.4	72.7	54.2	91	58	81.7	57	76.9	57.4
8	.....	.....	.....	.....	.....	.....	35.7	32.7	21.2	— 6.9	45.7	26.4	37.7	24.2	57	35.5	72.7	58	85.7	62	84.7	60.8	80.7	53.2
9	.....	.....	.....	.....	.....	.....	37.9	25.4	24.9	2.5	18.6	11.7	37.7	23.2	62.1	38.7	81.7	53	82.7	60.2	92.5	58	82.7	53
10	.....	.....	.....	.....	.....	.....	37.9	30.7	24.7	1.5	16.6	6.9	42.7	28.4	56.7	35.7	72.1	52.4	78.7	59	90.7	62	88.9	62
11	.....	.....	.....	.....	.....	.....	31.7	14.1	21.2	4	11.6	1.5	38.7	18.8	62.7	40.8	62.7	43.8	75.3	57.8	87.7	63	77.7	61.5
12	.....	.....	.....	.....	.....	.....	15.7	3.5	21.5	—12.9	7.6	— 2.7	33.7	11.3	71.7	40.8	69.7	47.8	74.3	53	97.7	65	69.9	54.5
13	.....	.....	.....	.....	.....	.....	11.6	0.1	41.9	14.4	17.6	1.5	43.7	15	79.7	49.8	68.9	46.8	74.7	57.8	78.9	61.2	79	48.8
14	.....	.....	.....	.....	.....	.....	18.6	7.2	38.7	21.2	25.7	11.9	56.7	27.4	62.7	44.8	78.7	47.8	89.7	56	80.7	58.8	87.5	59
15	.....	.....	.....	.....	.....	.....	11.6	0	39.5	9.6	34.7	10.9	60	29.2	72.7	43.8	84.7	53.8	93.2	57	81.7	52.4	83.7	58.8
16	.....	.....	.....	.....	.....	.....	5.6	1.1	39.7	18.8	45.9	12.9	41.7	22.2	73.7	52	65.7	58	74.7	59.7	84.7	54	66.7	51.8
17	.....	.....	.....	.....	.....	.....	16.4	— 8.4	20.7	7.9	36.7	23.2	37.9	25.4	66.7	44.8	73.7	61.8	79.7	61	88.7	54.4	66.7	49.6
18	.....	.....	.....	.....	.....	.....	30.9	6.7	14.6	— 2.7	48.7	33.9	47.9	20.2	56.7	44.2	70.7	58	81.7	56	86.7	61.4	66.9	55
19	.....	.....	.....	.....	.....	.....	35.7	11.7	31.9	— 1.2	51.7	32.7	49.7	29.4	63.7	40.8	75.7	56	94	58.4	78.7	50.4	72.7	56
20	.....	.....	.....	.....	.....	.....	26.9	— 4.7	41.7	17.5	50.7	13	39.7	29.8	65.7	47.8	71.7	53.8	78.5	58	81.9	59.6	67.1	53.2
21	.....	.....	.....	.....	.....	.....	24.2	0.8	29.5	16.8	49.7	17	38.1	28.6	54.7	40.8	80.7	51	80.7	48.8	67.7	55.8	66.7	42.8
22	.....	.....	.....	.....	.....	.....	42.5	13.9	31.7	12.3	34.7	23.2	46.7	27.4	61.9	43.5	91.7	63	83.7	56.2	67.7	51.4	68.5	34.5
23	.....	.....	.....	.....	.....	.....	40.7	17	39.2	20.3	19.6	2.5	44.7	32.7	71.7	45.8	82.7	65	85.7	53	69.3	45.8	68.7	51
24	.....	.....	.....	.....	.....	.....	26.7	6.7	24.7	3.7	22.7	1.5	43.7	24.2	72.7	49.8	72.7	47.2	89.7	59	74.7	45.2	71.9	49
25	.....	.....	.....	.....	.....	.....	26.7	—10.9	21.7	— 2.9	40.7	4.7	48.1	22.4	69.7	52	67.1	56	91.7	64	74.9	51	80.1	51
26	.....	.....	.....	.....	.....	.....	9.6	—20.9	22.7	3.6	36.7	12.9	45.7	26.4	60.7	45.8	80.7	54	85.9	69.4	81.7	54.8	78.7	51.2
27	.....	.....	.....	.....	.....	.....	7.6	— 8.3	22.2	3.6	31	8.7	46.9	27.4	74.7	45.8	85	48.2	78.7	62	83.7	53	79.5	55
28	.....	.....	.....	.....	.....	.....	21.5	4.7	27.7	— 4.5	33.7	13.9	46.7	23.2	91.7	48.8	90.3	48	73.7	55.2	85.7	52.8	69.7	51
29	.....	.....	.....	.....	.....	.....	12.6	— 1.9	.....	.....	29.9	2.5	39.9	25.4	81.7	55	90.7	65	80.7	57.2	81.9	53	64.7	52
30	.....	.....	.....	.....	.....	.....	0.5	—16.1	.....	.....	36.7	17	47.1	27.4	83.7	53	80.9	58	85.7	57.8	86.9	50.6	51.7	43.8
31	.....	.....	.....	.....	.....	.....	3.3	—14.9	.....	.....	22.7	7.7	.....	.....	77.7	61	.....	.....	76.7	60.2	77.9	58.4	.....	.....
Range	.....	.....	.....	.....	.....	.....	80°.4		64°.8		54°.4		59°.5		66°.3		47°.9		45°.2		52°.5		54°.4	
Monthly means	.....	.....	.....	.....	.....	.....	.....		.....		.....		.....		.....		.....		.....		.....		.....	

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Maximum, minimum, and mean temperatures—Continued.

PECK'S BEACH, N. J.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	45	30	27	20	43	30	36	30	65	33	78	56	75	63	74	66	75	59
2	.....	.....	.....	.....	.....	.....	46	40	36	22	45	28	43	32	54	45	62	53	78	65	77	63	81	54
3	.....	.....	.....	.....	.....	.....	48	40.5	36	29	51	38	51	36	51	34	62	54	78	63	78	55	81	63
4	.....	.....	.....	.....	.....	.....	48	41	37	26	65	38	48	25	52	40	74	56	86	63	72	53	74	65
5	.....	.....	.....	.....	.....	.....	50	38	36	21	42	29	46	20	50	44	70	60	79	59	75	53	73	66
6	.....	.....	.....	.....	.....	.....	48	38	30	16	40	33	64	43	60	40	72	64	67	60	77	58	76	63
7	.....	.....	.....	.....	.....	.....	52	47	31	22	51	37	56	42	55	39	73	62	70	58	76	65	85	63
8	.....	.....	.....	.....	.....	.....	48	31	34	13	45	32	44	38	67	42	90	62	72	64	72	67	88	62
9	.....	.....	.....	.....	.....	.....	43.5	30	34	12	37	27	44.5	40	78	47	87	67	78	66	79	66	77	62
10	.....	.....	.....	.....	*56	26	45	37	59	23	44	27	47	37	84	52	84	66	78	61	83	63	76	52
11	.....	.....	.....	.....	48	26	45	29	42	22	40	26	52	32	65	45	87	64	75	66	78	63	81	60
12	.....	.....	.....	.....	65	48	38	21	40	23	39	24	42	23	53	42	85	66	70	68	79	66	78	66
13	.....	.....	.....	.....	54	41	36	21.5	46	38	28	19	41	21	62	48	76	55	84	61	78	68	70	68
14	.....	.....	.....	.....	40	29	38	27	54	34	40.5	22	53	21	60	51	72	48	79	60	75	67	72	68
15	.....	.....	.....	.....	45	29	25	13	42	31	43	26	62	46	52	47	74	58	77	61	74	63	78	68
16	.....	.....	.....	.....	47	33.5	24	12	55	34	42	22	58	42	70	51	72	63	89	62	77	57	71	68
17	.....	.....	.....	.....	46	30	29	10.5	37	24	47	39	43	36	64	50	81	55	74	62	74	57	70	66
18	.....	.....	.....	.....	55	35	38	13	31	15	55	42	42	35	65	51	83	64	79	60	84	55	76	68
19	.....	.....	.....	.....	52	35	41	35	42	31	53	44	49	38	68	44	74	59	81	63	78	63	70	67
20	.....	.....	.....	.....	44	33	42	30	51	39	55	36	55	38	59	53	69	50	76	65	86	70	72	62
21	.....	.....	.....	.....	37	20	42	36	49	38	46	31	61	42	65	52	74	54	75	64	87	72	68	53
22	.....	.....	.....	.....	34	16	47	39	52	43	56	39	49	35	67	48	82	60	74	62	82	65	64	50
23	.....	.....	.....	.....	35	29	63	40	61	43	46	27	49	43	61	44	90	65	78	56	72	66	68	48
24	.....	.....	.....	.....	40	22	40	27	43	31	36	17	51	40	56	53	89	64	77	61	71	60	71	54
25	.....	.....	.....	.....	37.5	22	28	19	35	30	44	24	45	41	65	52	84	56	79	64	70	66	73	59
26	.....	.....	.....	.....	40	28	32	11	36	23	48	40.5	47	35	72	53	88	69	79	69	68	52	71	63
27	.....	.....	.....	.....	44	34	42	32	39	30	45	37	57	31	70	44	75	67	79	69	68	51	73	59
28	.....	.....	.....	.....	41	30	51	39	39	21	53	31	46	40	73	54	75	65	80	66	70	58	67	65
29	.....	.....	.....	.....	40	31	46	29	.....	.....	47	33	45	34	67	54	82	69	78	67	74	50	72	58
30	.....	.....	.....	.....	35	21	38	29	.....	.....	50	34	54	32	68	54	82	67	81	59	72	54	64	50
31	.....	.....	.....	.....	36	21	44	26	.....	.....	45	28	.....	.....	66	55	.....	.....	81	60	78	57	.....	.....
Range	.....		.....		.....		52°.5		49°		48°		44°		51°		40°		33°		37°		40°	
Monthly means	.....		.....		36° 5		35°.7		33°.4		38°.7		42°.7		55°.4		69° 1		70°.2		69°.2		67°.5	

* Station opened December 10, 1873.

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Maximum, minimum, and mean temperatures—Continued.

PEMBINA, DAK.

	1873.						1874.															
h.	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	42.5	30	34	15.5	14	− 3	26	12	15	1	39	21	30	16	61	42	68	42	69	47	71	.....	69	54
2	38	23	28	− 4	13	− 6	28	16	16	3	31	5	26	3	55	33	68	50	77	51	80	.....	63	44
3	41	20.5	41	− 6	0	−11	16	−20	7	0	5	−19	16	− 2	57	34	74	49	83	63	83	.....	75	36
4	52.5	35.5	22	1.5	− 2	−14	− 9	−31	11	− 1	12	−21	30	− 1	63	25	65	49	83	56	78	.....	74	44
5	34.5	23	25	2	− 9	−31.5	17	−19	13	0	30	5	32	16	67	32	64	40	82	64	81	.....	72	44
6	63	17.5	38	23	8	−22	19	0	15	4	15	− 4	25	0	66	26	62	40	87	55	79	.....	80	53
7	72	35	19	13	25	5	30	9	23	4	6	− 4	32	15	78	37	69	53	84	54	82	.....	85	54
8	72	41	27	13	29	10	31	5	19	− 2	4	−21	27	1	96	56	56	37	85	62	86	.....	87	56
9	65.5	40	33.5	12	12	− 6	5	− 8	15	−10	13	−10	46	22	75	52	66	32.5	80	56	89	.....	83	69
10	59	37.5	34	15	13	−11	4	− 6	-7	− 6	10	−15	32	14	80.5	42	62	48	72	51	84	.....	71	59
11	56	32	34	12.5	15.5	− 5	− 1	− 8	23	− 6	3	−17	35	8	49	37	65	46	81	47	70	.....	63	43
12	63	31	20.5	2	14	− 7.5	− 6	−12	14	0	6	−27	50	25	59	33	63	39	82	65	70	.....	65	40
13	55.5	37	20	− 5	16.5	− 7	−20	−35	6	−13	25	−18	49	34	62	29	73	41	80	60	68	.....	68	45
14	55	25	32.5	9	22	− 1	−15	−27	1	−27	35	20	34	18	62	36.5	80	48	81	59	77	.....	52	34
15	43	33.5	43	15	23	2	− 1	−15	12	−13	37	20	40	13	64	32	79	54	80	50	85	.....	61	24
16	54	22	40	32.5	24	3	18	− 3	10	−15	40	34	44	26	57	35	84	50	81	63	73	.....	53	50
17	45	36	32	12	21	− 2	31	6	23	− 5	38	24	35	14	60	30	92	55	85	51	70	46	57	49
18	42.5	34	14	− 2	19	8.5	6	−21	32	19	25	15	25	8	72	39	87	60	89	(*)	72	46	54	47
19	48	30	16.5	− 2	11	−11.5	0	−36.5	22	−17.5	23	10	34	15	61	38	89	54	70.5	.....	75	57	53	40
20	60	29	25	6	− 2	−24	24	− 8	6	−14	19	8	39	18	62	37	86	54	85	.....	71	54	54	40
21	51	32.5	26	12	19	−12	21	−18	− 4	−33	33	6	37	20	68	55	83	63	87	.....	78	56	65	40
22	33	20	23	8	22	8	−10	−30	5	−20	16	− 4	35	12	77	53	73	56	87.5	.....	76	45	69	36
23	33.5	17	30.5	15	20	0	−10	−29	− 8	−24	18	− 8	48	19	67	49	81	51	79	.....	69	60	69	44
24	31	22	34	15	16	− 9	12	− 4	− 4	−32	43	6	54	35	73	56	91	70	91	.....	77	59	82	39
25	30	21	15	− 4	31.5	10	−19	−44	11	−25	20	− 2	38	21	72	41	67	63	63	.....	82	54	81	53
26	35	13	14	6	19	− 5	12	− 4	15	−22	18	− 5	40	18	88	57	79	60	69	.....	68	62	58	45
27	25	19	10	−11	18	−11	6	− 1	8	− 8	13	1	44	29	69	53	71	64	78	.....	70	56	68	38
28	30	5	0	−21	25	5	0	− 6	27	−16	21	− 1	56	34	69	49	64	54	75	.....	71	65	67	34
29	35	22.5	1.5	−27	14	− 6	− 4	−26	.....	.....	31	6	70	41	70	58	72	49	75	.....	74	59	63	30
30	16	13	7	− 5	14	− 5	− 9	−30	.....	.....	20	− 1	70	39	70	47	64	59	85	.....	76	47	80	33
31	26	10	.....	.....	32	2	5	−30	.....	.....	36	1	.....	.....	62	38	.....	.....	70	.....	75	61	.....	.....
Range	67°		70°		63°.5		75°		65°		70°		72°		71°		59°.5		.....		.....		63°	
Monthly means	35°.4		16°.1		6°.6		−3°		2°.6		11°.9		29°.4		55°.3		64°.4		69°.9		67°		56°.2	

*Minimum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

PHILADELPHIA, PA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	62.5	46	60	31	32	23.5	43.5	32	29.5	17	50	29.5	35	27.5	65	43.5	75	56	85	65	87	67	81	66
2	63.5	51	61	31	38	23.5	47.5	36.5	27	11	58	34	44.5	31	55	42	69	51	81	68	81	66	83	62
3	70	54	59	43	57	34	61	39.5	35	20	65	37	50	36.5	62	36.5	66.5	51.5	81	66	75	60	88	62.5
4	72	52	58.5	33.5	70	50	66	50.5	36.5	27	67	37	45.5	25	59.5	44.5	73	52	86	71	76	59	70	59
5	70.5	65	55.5	44	51	31.5	61.5	34	31	23	52	29	37.5	22	59	43.5	83.5	61.5	76	66	78	59	74	63
6	73.5	59	56	34.5	38	30.5	45	32	26	17.5	42	31	58	33.5	63.5	44.5	78	70	75	61	81	64	76.5	63
7	73	40	49	35	34.5	29	62	55.5	24.5	16.5	40.5	32	48.5	42	54.5	44	86.5	68.5	80	60	77	65	84	(*)
8	62	41	52	41	44.5	33	56.5	36.5	30.5	20.5	44.5	31.5	54.5	36	70	41	91	73	88	66	72	64	86	.....
9	69.5	49	54.5	42	50.5	41	51.5	34.5	31	17	34	29.5	46	38.5	83	53.5	94	77	91	78	82	65	77	.....
10	64	45	37.5	32	45	37	49.5	36.5	31.5	25.5	42	21	45	36	87.5	58.5	83	72	91	71.5	86	66	85	.....
11	65	46.5	44	31	47	33	43.5	33	39	27	38	27	58	28	70	45	73.5	65	87	68	85	64	90	.....
12	69	51	45	37	66	46.5	35.5	27	37.5	21	36.5	24	40	17.5	65	42	85	65	86	69	87	68	87	.....
13	62	42	37.5	28.5	59	39	32.5	25	51	27.5	28.5	19	46.5	28	74	49	71	61.5	84	69	84	68	72	.....
14	69	44	34	24.5	40.5	31.5	35	25	53.5	37	39	23	62	34.5	80	57	72	56	89	71	75	66	70	.....
15	69	46.5	44	26.5	47	31.5	28.5	12	44.5	30	48	28	64	35	68	51.5	79	61.5	90	72	80	65	78	.....
16	70	45.5	56	32	52	34	25	10.5	54.5	33.5	44	30.5	59.5	43	66	50.5	79	59.5	88	72	82	65	70	.....
17	70	53.5	43	33.5	55.5	34.5	31	14	38.5	22	54	37	47.5	36	72	56	80	66	80	65	80	60	69	.....
18	67	55.5	40	31.5	54.5	38.5	33	14.5	37.5	18.5	59.5	46	49	34.5	66	52.5	82	63	86	62	87	63	75	.....
19	73.5	58	37	29	47.5	34	38	27.5	45	25.5	66	48	50	37	68	46	74	64	89	71	84	66	69	.....
20	74.5	49	34	20.5	45	34.5	41.5	27	46	37.5	63	43	46.5	42	64	51	67	57	89	62	93	67	71	.....
21	70	45	37.5	21	35	27.5	44.5	27	68	39	53.5	37	58	43	62	52	76	58	80	70	95	72	68	.....
22	57	43	42.5	30.5	38	25	63	41	61	40	53	40	56.5	40	68	47	87.5	64	81	64	79	65	69	.....
23	66	43.5	40.5	37.5	31.5	27	66	39	75	37	47.5	26.5	48.5	40	70	49	92	68	83	66	70	60	74	.....
24	67	48	47.5	37	41	26	44	27.5	51.5	32.5	36	19.5	56.5	40.5	60.5	53.5	86	70	83	64	72	60	74	.....
25	64	42	43	34	41	26.5	30	20	34	24	50	25	56.5	37.5	80	54	87	62.5	82	62	71	62	77	.....
26	58	40	35.5	26	37	31	29	15	40	23.5	59.5	40.5	46	35.5	69.5	55.5	87	73	85	67	71	57	83	.....
27	64	52	49	22.5	38	33.5	43	29	40	26	53.5	34.5	56	39	72	54.5	81.5	70	83	70	72	55	80	.....
28	63.5	44	41	28	42	30.5	54.5	39	42.5	28	50	38	49.5	35.5	80	55	89	66	85	68	74	55.5	69	.....
29	57	32	36.5	27	40.5	29.5	43.5	32.5	.....	.....	48.5	31.5	43.5	29	85	57	97	72	75	68	75	56	55	.....
30	46	31	33.5	26	37	23	41.5	23	.....	.....	57	34.5	55	33.5	81	59	87	74	81	62.5	80	57.5	64.5	.....
31	53	38	.....	.....	37	19.5	33	22	.....	.....	49.5	30.5	.....	.....	83	60	.....	.....	84	65	80	61	.....	.....
Range	43°.5		41°.5		50°.5		55°.5		64°		48°		46°.5		51°		46°		37°		40°		.....	
Monthly means	54°.7		38°.3		38°.3		36°.7		33°.2		40°		42°.5		59°.9		73°		74°.7		71°.1		68°	

* Minimum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

PIKE'S PEAK, COL. TER.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.	Min.	Max.	Min.
1	.....	.....	(*)	.....	15	6	20	4	2	−11	15	− 2	15	− 6	27	14	28	20	47	31	56	33.8	52.1	32.2
2	.....	.....	21	.....	6	− 1	15	9	4	− 7	13	3	9	− 6	14	− 2	35	19	52	32	51	33.2	37	28
3	.....	.....	26	12	− 1	−26	13	−23	14	−10	8	− 3	19	− 6	14	1	38	23	52	34	50.3	32.8	30	21
4	.....	.....	26	9	2	−13	1	−25	9	1	4	− 5	15	3	28	4	38	25	57	36	48.4	32.2	37	20.3
5	.....	.....	30	10	9	0	11	− 1	6	−11	4	− 9	14	1	35	14	38	26	52	38	51.8	33.8	47	23
6	.....	.....	26	9	8	2	15	− 2	10	−10	− 3	−15	14	0	40	19	37	27	52	35	48	33.9	50	27.6
7	.....	.....	27	9	10	0	15	5	13	0	7	−12	12	− 6	33	22	43	30	52	37	54	33.5	50	31.3
8	.....	.....	28	12	6	− 2	10	4	8	− 5	12	− 3	7	− 8	28	14	42	32	49	38	53	34	41.2	32
9	.....	.....	30	15	7	− 5	16	4	20	− 1	14	2	13	− 1	14	5	41	31	54	38	51.5	35	49.3	31
10	.....	.....	27	12	9	2	16	7	18	4	14	5	24	8	20	5	37	22	55	36	51	30	44	28
11	.....	.....	21	12	9	− 5	15	4	11	2	14	1	15	9	24	10	33	18	56	37	48	30	47	27.3
12	.....	.....	23	10	− 2	−12	14	2	10	−10	18	3	16	7	21	14	38	21	54	39	54	31	39	21
13	.....	.....	27	14	8	− 6	14	1	3	−16	17	4	13	2	22	15	40	27	54	37	50	33	29.7	20
14	.....	.....	28	14	11	− 1	23	6	5	− 4	9	− 2	14	− 1	26	13	31	20	50	35	54.5	32.2	35.6	20
15	.....	.....	24	10	16	8	13	5	15	3	7	− 2	1	− 7	28	13	36	19	42	34	49	35.9	44	24
16	.....	.....	30	15	10	2	23	1	15	5	8	− 6	10	− 9	38	18	45	25	48	35	47.5	35.8	37.9	22
17	.....	.....	32	10	7	− 4	20	4	16	4	7	− 6	7	−11	42	24	46	28	50	36	42.3	33.7	36.2	19
18	.....	.....	15	− 1	0	−11	14	4	9	3	6	−12	14	− 6	40	23	50	30	49	35	53	32.8	27.2	15.5
19	.....	.....	20	7	7	− 6	10	2	10	0	3	−15	10	− 1	43	25	50	30	45	36	54.9	35	36.2	13
20	.....	.....	20	8	14	− 5	10	− 4	12	−10	10	− 3	11	1	41	20	56	33	48	34	54	34	40	15.2
21	.....	.....	20	7	8	1	4	− 9	− 9	−18	16	− 4	19	6	38	27	57	36	53	35	50.5	33	38.2	21.7
22	.....	.....	12	− 1	11	2	10	−18	−15	−26	19	1	9	− 5	42	26	51	37	46.5	34.4	46.7	34	28.8	22
23	.....	.....	10	− 6	6	− 7	8	−18	− 8	−26	20	6	5	− 8	45	28	53	35	42	36	47	23	25	17
24	.....	.....	18	5	14	− 9	9	− 9	− 8	−22	18	6	14	− 3	42	28	55	33	54.9	35	44	31	29	17
25	.....	.....	21	11	18	6	21	1	1	−20	17	4	20	9	38	26	53	33	57.2	36	39	31	34	19
26	.....	.....	18	6	7	− 8	21	5	3	− 9	20	4	23	11	45	27	53	35	40.5	32.5	45.5	32.8	32	21
27	.....	.....	11	4	19	4	7	− 5	14	− 5	17	6	24	6	41	27	48	29	38.6	32	48	31.3	38	26
28	.....	.....	16	6	22	12	15	− 1	10	2	17	8	30	13	31	18	45	25	48.2	30.9	53.2	28.3	37.2	27.1
29	.....	.....	23	7	16	10	15	2	.....	.....	17	9	32	17	32	23	50	24	53.3	33.7	40.5	30	45.5	27.2
30	.....	.....	21	12	22	11	8	0	.....	.....	13	4	35	17	31	26	47	30	59	38.8	49.3	33	40.2	21.2
31	.....	.....	.....	.....	22	8	5	− 6	.....	.....	17	2	.....	.....	31	25	.....	.....	55	36.3	52.4	31.7	.....	.....
Range	.....	.....	.....	.....	48°		48°		46°		35°		46°		47°		39°		28°.1		33°		25°.1	
Monthly means	.....	.....	15°.9		4°.5		6°.1		0°.5		4°.8		7°.7		23°.6		35°		42°		39°.5		29°.6	

* Station opened November 1, 1873.

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Maximum, minimum, and mean temperatures—Continued.

PITTSBURGH, PA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*55	.....	65	85	54
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63	.....	59	89	56
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	.....	51	89	61
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	†76	51	72	60
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	76	53	88	61
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	57	81	59	85	63
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	85	62	87	59
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	74	64	91	62
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	87	58	83	62
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	85	63	82	54
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	92	65	90	55
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	97	(‡)	93	60
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	85	.....	97	62
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	80	.....	90	67
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	81	.....	81	69
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	86	.....	71	65
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54	89	.....	74	64
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	59	88	62	82	59
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69	92	61	88	66
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	95	69	70	54
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63	96	68	69	45
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52	75	64	74	45
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	58	69	60	80	48
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	74	62	83	53
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	75	58	85	55
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	78	57	83	55
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	77	57	69	62
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	63	78	51	62	54
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	79	51	65	53
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	82	50	54	49
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64	82	56	.....	.....
Range																							52°	
Monthly means	57°. 3		35°. 8		37°. 1		35°. 5		34°. 4		39°. 3		43°. 3		61°. 9		73°. 9		74°. 7		70°. 4		67°. 6	

* Station supplied with minimum thermometer July 1, 1874. † Station supplied with maximum thermometer August 4, 1874. ‡ Minimum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

PORTLAND, ME.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35	12	45	34	62	50	79	57	77	60	75	58
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40	21	45	35	60	47	65	56	75	59	78	56
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	30	57	36	66	52	65	56	70	55	82	54
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33	16	65	40	59	51	61	52	70	50	65	47
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	41	15	56	41	65	52	59	52	75	57	66	47
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	30	60	39	67	57	68	54	71	55	70	56
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	32	49	34	61	54	67	53	73	56	70	59
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	32	53	34	82	55	89	65	65	61	71	52
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	43	33	51	35	67	54	82	66	64	60	69	58
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	38	30	55	42	74	52	70	59	83	63	86	54
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*34	11	44	30	59	39	60	51	75	61	78	63	79	59
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25	10	34	18	60	40	54	50	68	57	78	58	75	49
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29	8	38	19	81	45	65	50	67	55	71	62	67	47
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35	18	52	30	73	54	77	49	86	63	63	57	67	47
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40	18	59	41	60	46	77	53	92	67	77	58	69	57
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	31	51	35	50	45	73	57	87	70	75	57	71	60
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	49	33	40	28	68	46	70	58	82	64	71	56	70	55
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50	38	47	26	56	45	72	58	81	61	81	56	(†)	.....
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	47	60	35	66	48	66	48	75	60	74	61	.....	.....
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	53	29	45	33	65	43	57	47	77	62	81	60	61	50
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50	28	47	31	57	45	72	53	80	63	78	63	66	50
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	43	30	51	32	61	45	74	56	77	60	71	57	63	45
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39	16	42	34	68	44	84	61	76	57	65	48	64	43
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35	3	50	35	59	47	72	59	79	60	72	52	63	47
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50	16	42	30	53	45	77	55	76	62	67	52	62	52
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	51	38	35	30	69	45	75	53	73	60	71	48	61	49
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47	27	48	30	70	53	75	51	73	59	71	51	59	50
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	43	27	50	30	77	51	91	57	76	61	75	50	65	48
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36	24	42	34	66	54	75	54	68	59	70	59	63	58
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	22	38	30	64	53	67	53	80	62	72	57	65	49
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	44	16	.....	.....	72	53	.....	.....	76	61	76	56	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48°		47°		44°		40°		.....		.....	
Monthly means	50°.5		29°.2		26°.3		24°.9		24°		32°.7		36°.7		52°.5		61°.7		67°.2		64°.6		60°.3	

*Station supplied with maximum and minimum thermometers March 11, 1874.

†Observer sick.

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Maximum, minimum, and mean temperatures—Continued.

PORTLAND, OREGON.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	.....	72	58	77	44
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	.....	72	53	83.5	53
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	.....	76	48	88.5	53
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	78	52	79	49
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	.....	75	56	73	49
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	.....	71	56	69	57
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	.....	70	53	67	54
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	.....	74	54	65	51
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86.5	.....	72	58	66	50
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	.....	69	57	63	49
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	.....	69	54	68	47
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	74	56	68	49
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	.....	68	58	69	49
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*89	45	81	.....	71	49	69	57
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	82	49	74	.....	71	49	70	53
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	48	79	.....	84	49	68	45
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	45	72	.....	83	59	68	54
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	46	80	.....	72	48	73	43
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	49	85	.....	78	48	72	49
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	48	84	.....	73	56	76	51
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	46	80	.....	72	57	82	49
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64	43	82	.....	80	46	78	45
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	45	77	66	79	60	65	45
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69	47	76	55	71	59	69	51
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	46	81	53	74	57	69	46
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	45	86	52	74	56	79	49
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50	22	84	54	72	56	71	52
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	50	71	58	73	48	70	44
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	57	73	55	79	48	70	44
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	(†)	79	51	68	52	70	42
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	50	65	50	.....	.....
Range	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		38°		46.°5	
Monthly means	49°.9		47°.4		37°		42°.9		43°.7		45°.1		53°.9		59°.7		60°.2		68°.3		64°.7		61.°4	

*Station supplied with maximum and minimum thermometers June 14, 1874. †Minimum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

PORT STANLEY, CANADA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																	64	45	76	44	82	61	77.5	67
2															52	31	67	42	73.8	53	74	52	79	50.2
3															53	25	66	56	76	51	74.5	46.2	75	49.2
4															53	44	74	56.8	87.5	61.5	75.4	46.4	70.5	41.2
5															60	37	74	56.8	82	50.5	73	47.7	76	60.1
6															55	32	74	58	82	52.8	75	52.7	76	55.2
7															49	24	77	60	83.5	63	82	61.6	78	55.2
8															62	35	73	54	82.8	62	85	61.1	89	67.5
9															61	35	84	54	82	61	81	58.7	80.8	58.7
10															65	47.5	74	56	76	65.5	81	63.6	80	55.2
11															64	48.5	68	53	77	60	84.5	69.1	81.2	58.2
12															65	48.5	64	51	65	56	93	67.1	82.5	52.7
13															66	50.5	66	47	75	56	77	60.1	82.2	57.2
14															66	42	70	51.2	82	56	80	54.2	83	61.1
15															71	45.5	70	51	79	66	85	51.2	78	51.7
16															64	48.5	64.8	59	71	51	79	50.2	70	47.4
17															52	40	76	57	74.8	46	82	59.2	68	59.2
18															62	38	79	54	81	56	82	56.7	76	65.1
19															56	34.5	75	52	83	58	83.4	50.2	81	59.2
20															55	45	75	55	74.8	56	85	69.9	64	46.7
21															61	42.5	74	60	79.8	51	80.5	62.1	68	39.2
22															67	40	77	62	80	50	77	57.6	67	41.7
23															64	46	88	67	80.5	50.5	78	56	74	44.2
24															68	48.5	77	59	83.5	57	74.8	50.2	77.4	49.4
25															69	55	80	37	80	70	77	51.2	75.2	49.2
26															63	50	75	61	75.5	69	76	48.2	78	56.2
27															66	40	77	61	71.5	61	78	51.2	70	53.7
28															73	46	88	65	74	61	77.8	60.1	64	50.2
29															78	61	85	63	79	55	77	53.7	69.5	40.7
30															77	58	85	50	78	50	77	48.2	53	43.2
31															78	58			87	67	80	49.6		
Range																	51°		43°.5		46°.8		48°.3	
Monthly means																								

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Maximum, minimum, and mean temperatures—Continued.

PUNTA RASSA, FLA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	(*)	76	.....	59	.....	67	70	49	75	65	78	70	85	72	82	60	88	71	86	72	87	75	.....	75
2	.....	76	.....	66	.....	64	73	55	76	62	74	65	84	71	82	68	89	73	83*	72	86	81	.....	79
3	.....	74	.....	67	.....	65	76	59	74	68	70	55	84	62	84	74	86	75	87	73	87	81	.....	77
4	.....	74	.....	71	.....	67	69	62	72	63	73	55	84	61	83	72	84	74	89	75	90	82	.....	76
5	.....	74	.....	71	.....	67	72	62	76	59	82	63	85	67	79	70	86	74	85	71	90	74	.....	76
6	.....	70	.....	71	.....	67	70	61	76	65	81	66	87	66	71	63	87	74	88	72	88	74	.....	76
7	.....	63	.....	73	.....	65	68	58	77	68	82	68	85	71	79	59	88	74	88	72	87	75	.....	73
8	.....	59	.....	69	.....	64	59	49	71	62	78	65	84	72	82	64	88	74	80	72	89	75	.....	72
9	.....	64	.....	63	.....	68	60	42	64	55	75	55	84	71	84	65	90	72	87	78	89	77	.....	73
10	.....	68	.....	62	.....	65	67	58	63	52	76	55	73	67	82	65	90	75	91	71	88	76	.....	72
11	.....	66	.....	62	.....	64	70	56	70	50	77	67	76	55	81	67	90	74	88	70	91	76	.....	72
12	.....	67	.....	64	.....	64	74	58	73	55	72	65	79	57	78	70	88	75	88	71	90	78	.....	72
13	.....	68	.....	52	.....	69	75	61	74	64	72	56	81	64	79	71	88	73	88	74	89	72	.....	74
14	.....	70	.....	46	.....	57	69	60	75	65	75	55	83	65	78	72	90	70	87	72	87	75	.....	75
15	.....	71	.....	51	.....	53	67	49	76	67	79	60	80	64	80	72	89	75	85	71	89	76	.....	77
16	.....	70	.....	53	.....	59	56	47	75	66	79	65	81	69	82	71	90	74	86	71	90	71	.....	76
17	.....	69	.....	61	.....	59	68	54	77	67	81	65	81	68	84	71	89	74	88	73	88	72	.....	75
18	.....	71	.....	63	.....	59	73	56	78	69	81	66	86	76	81	72	89	74	82	72	89	75	.....	76
19	.....	71	.....	52	.....	59	71	55	77	62	80	66	82	70	85	69	89	73	86	73	88	76	87	75
20	.....	61	.....	44	.....	58	72	54	82	65	80	66	83	71	88	69	89	74	82	71	81	72	88	76
21	.....	57	.....	42	.....	50	79	61	83	66	83	65	86	70	84	70	91	72	85	74	90	74	85	75
22	.....	58	.....	53	.....	61	74	65	82	66	83	71	84	72	84	69	88	71	88	78	88	74	87	73
23	.....	61	.....	62	.....	65	77	65	82	66	82	66	84	71	87	69	85	73	85	79	87	75	86	74
24	.....	66	.....	66	.....	62	77	65	84	69	83	66	83	71	88	70	89	72	83	73	88	78	87	75
25	.....	68	.....	62	.....	69	71	56	80	68	84	66	81	71	87	71	88	75	88	72	86	79	84	74
26	.....	67	.....	55	.....	57	68	52	79	62	83	68	73	64	87	73	89	77	87	76	(†)	72	82	74
27	.....	67	.....	61	....	56	71	53	80	62	85	70	81	62	90	70	88	81	86	75	.....	72	80	74
28	.....	66	.....	57	56	46	71	59	80	61	83	69	83	64	90	72	89	72	89	75	.....	73	81	76
29	.....	57	.....	56	62	40	71	58	.....	.....	84	68	75	64	89	72	81	70	88	79	.....	73	78	71
30	.....	60	.....	61	62	45	75	58	.....	.....	85	70	82	55	87	72	80	73	88	79	.....	73	77	67
31	.....	59	.....	.....	66	45	76	61	.....	.....	84	70	.....	.....	84	74	.....	.....	87	82	.....	77	.....	.....
Range	.....		.....		.....		37°		34°		30°		32°		31°		21°		21°		.....		.....	
Monthly means	72°.8		66°.9		65°.6		63°.3		69°.1		72°.1		74°.3		76°.1		79°.9		79°.7		83°.7		79°.2	

* Maximum thermometer out of order.

† Maximum thermometer broken.

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Maximum, minimum, and mean temperatures—Continued.

ROCHESTER, N. Y.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	61	41	43	27	18	10	40	34	14	6	47	26	36	19	51	35	64	52	80	53	76	75	80	57
2	58	39	54	33	43	18	41	36	21	− 5	58	37	48	27	45	33	66	45	78	62	67	57	82	54
3	53	40	50	29	58	43	57	42	30	21	60	41	35	22	55	38	69	54	77	55	67	54	72	55
4	64	44	56	27	63	32	69	34	25	20	55	23	23	15	55	41	80	59	73	60	69	50	68	50
5	61	52	49	29	32	24	34	25	23	9	27	20	33	16	57	42	85	66	77	59	74	59	85	57
6	48	40	38	28	31	25	35	24	16	9	33	20	37	30	50	35	77	60	85	60	78	53	75	60
7	50	38	52	26	31	18	38	33	20	11	46	33	44	34	52	32	87	62	94	69	78	65	77	58
8	61	41	48	41	43	24	39	34	25	5	34	24	40	31	60	45	71	61	84	70	80	65	76	62
9	65	40	41	29	53	37	40	32	28	11	24	15	34	31	77	51	82	60	79	65	84	61	82	55
10	74	46	31	26	38	34	39	31	25	18	25	14	41	28	80	51	71	58	74	67	75	64	88	59
11	72	52	36	27	49	33	36	26	26	18	25	18	35	24	60	42	59	50	73	63	88	62	89	67
12	47	40	38	29	44	34	37	23	43	10	20	8	34	20	82	53	66	52	64	59	96	72	75	64
13	55	40	31	22	34	22	27	21	48	38	18	7	49	20	77	58	66	49	73	59	72	62	90	62
14	63	50	28	19	32	19	27	15	39	26	29	18	66	43	62	49	73	49	87	59	74	58	90	67
15	63	42	36	23	36	30	15	6	43	24	32	16	59	34	79	47	77	56	89	72	78	52	83	65
16	74	51	41	29	45	33	15	5	39	24	47	25	35	29	73	51	70	66	75	64	81	56	65	58
17	60	40	33	29	46	33	25	10	24	16	53	35	35	30	60	47	69	60	75	53	86	62	70	58
18	69	55	33	29	41	36	39	20	24	15	63	45	49	32	50	43	73	58	85	60	82	64	74	59
19	54	41	30	25	37	29	42	27	42	19	60	39	51	37	60	42	75	55	91	69	79	53	77	62
20	44	40	29	21	34	24	27	12	40	36	39	31	62	38	53	45	67	55	80	64	83	72	69	53
21	49	40	28	20	26	20	45	12	38	31	50	31	50	34	71	45	72	52	75	57	79	61	61	46
22	58	39	35	26	28	19	59	41	31	28	41	23	50	34	60	43	87	58	78	55	66	60	68	46
23	68	47	37	25	30	15	48	26	45	28	24	14	48	37	69	43	86	70	84	59	69	50	73	52
24	49	38	40	28	35	17	33	18	29	19	25	13	41	31	74	54	70	58	90	62	70	56	75	58
25	48	36	30	18	35	31	18	10	28	20	49	22	44	29	76	53	81	53	90	70	73	49	80	56
26	53	34	22	14	36	29	28	5	25	15	46	27	43	31	54	47	72	55	79	72	75	50	83	56
27	54	41	34	14	35	30	40	28	31	16	36	23	41	30	75	49	79	57	74	62	76	55	80	63
28	45	32	27	15	33	25	40	24	58	23	35	25	35	31	87	56	92	62	65	59	75	53	66	55
29	38	30	28	20	32	23	34	19	.....	.....	35	19	38	30	72	59	85	66	74	61	78	54	63	50
30	43	29	20	14	24	11	19	1	.....	.....	38	28	47	32	86	59	73	55	79	57	80	55	55	46
31	48	28	.....	.....	35	20	14	2	.....	.....	29	20	.....	.....	85	64	.....	.....	81	73	80	58	.....	.....
Range	46°		42°		53°		68°		63°		56°		50°		55°		47°		41°		40°		44°	
Monthly means	48°. 6		30°. 3		31°. 6		28°. 9		25°		31°. 5		35°. 7		56°. 5		65°. 6		70°. 7		68°		65°. 5	

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Maximum, minimum, and mean temperatures—Continued.

SALT LAKE CITY, UTAH.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	98	64	81	63	72	60
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	98	66	90	61	66	52
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*81	56	98	74	91	63	69	51
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	81	49	85	68	90	66	76	48
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	59	91	64	88	69	84	50
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	55	88	66	91	71	96	58
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	61	95	67	88	69	89	62
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	51	92	68	88	63	88	61
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	47	91	65	94	65	77	53
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	43	92	63	82	65	74	42
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	45	93	66	82	57	58	44
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	50	88	69	90	63	65	43
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	53	94	64	90	62	67	44
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	48	89	67	91	62	72	46
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	51	90	67	90	65	82	48
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	55	93	67	88	65	74	48
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	62	86	68	90	68	63	47
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	50	87	65	82	68	60	41
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	56	87	67	77	59	69	41
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	59	85	70	86	60	67	53
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	72	90	65	80	66	70	51
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	68	88	68	86	60	71	50
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	55	87	56	91	64	74	47
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	52	77	67	88	67	76	50
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	63	79	65	77	59	76	50
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	59	82	63	76	62	75	49
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	60	85	60	75	56	79	50
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	54	92	64	80	61	79	49
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	53	92	67	87	63	81	53
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	55	90	67	85	65	81	54
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	64	84	62	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	42°		38°		49°	
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33°.1		48°.2		61°.6		68°.1		78°.2		74°.7		62°.6	

* Station supplied with maximum and minimum thermometers June 3, 1874.

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Maximum, minimum, and mean temperatures—Continued.

SAN ANTONIO, TEX.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	83.5	69	67	58	73	63	76	48	46	33	74	62	65	38	89	64	87	70	91	74	97.5	76	93.5	73
2	87	66	78	64	77	64	78	50	58	34	79	61	78	36	94	68	90	71	86	72	98.5	75.5	95	72
3	93	66	60	54	86	45	77	60	61	32	88	66	79	41	86	62	91	69	88	72	98.5	76.5	94	74
4	93	75	71	55	56	38	52	39	56.5	46	76	60	80	49	78	52	92	70	91	72	97.5	76.5	86	74
5	93.5	66.5	70	56	60	51	46	30	70	54	89	58	89	67	82	57	94	71	89	74	98.5	73	81	73
6	80	54	73	53	72	55	63	25	58	43	80	55	88	72	84	51	96	72	91	73	99	69.5	74	72
7	79	48.5	76	46	80	63	65	30	68	32	70	40	92	68	83	53	95	72	92	74	97	73	89	74
8	82.5	46.5	80	48	80.5	68	74	32	75	32	65	54	69	49	83	58	94	73	93	72	95.5	74.5	88	76
9	86.5	54.5	80	49	78	67	73	44	64	40	76.5	63	67	43	84	66	94	75	93	74	96.5	75	85	76
10	90	58	84	47	78	66	78	35	68	40	81	57	75	33	78	68	96	75	94	75	96.5	77	88	75
11	86.5	66	83	47	77	67	78	51	79	52	64	44	73	34	85	69	96	70	93	73	98	76	80	75
12	91	60.5	64	38	69	44	67	54	77	59	64	46	75	56	83	63	94	71	94	73	95	74	89	71
13	92	58	66	34	59	34	80	50	76	53	56	53	89	67	82	66	93	72	94	73	96	77.5	87	68
14	87	70	74	44	57	32	42	32	80	46	63	56	85	69	89	64	95	73	94	74.5	101.5	75	87	70
15	89	68	73	64	65	32	36	31	71	58	80	56	89	66	89	65	93	73	92	75	103.5	74	76	68
16	88	69	87	58.5	75	40	42	31	73	60	86	66	74	56	88	62	94	67	80	74	94.5	75	86	64
17	85	69	82	47	76	59	57	30	71	47	89	68	64	50	90	57	90	67	86	74	101	73	86	71
18	78	53	63	44	80	54	71	50	74	36	85	69	60	49	92	57	84	70	84	74	94.5	73	85	76
19	76	47.5	65	31.5	64	41	63	55	82	66	74	63	73	46	95	60	89	69	84	73	94	73	80	73
20	80	46.5	71	37	56	38	77	61	76	56	57	54	86	46	95	58	90	69	88	73	85	74	86	68
21	83	54	79	46.5	54	41	81	65	80	44	76	60	84	60	94	65	86	69	89	73	94	75	82	72
22	77	45	74	63	59	40	74	52	62	44	69	58	91	55	93	69	88	67	89	71	95	74	83	73
23	67	42.5	71	50	49	36	66	47	51	31	60	54	55	46	92	66	83	70	91	71	97.5	74	74	68
24	73	42	65	46	49	42	54	44	56	31	61	49	62	48	88	70	74	69	94	73	86	74	81	67
25	80	60	65	47	60	32	49	41	54	35	66	50	85	40	88	65	86	71	95	73	91	73	77	69
26	86	57	73	47	65	32	48	43	71	49	82	59	87	45	90	65	89	74	95	75	93	74	84	70
27	67	48	72	49	63	31	76	40	63	55	79	65	87	55	88	67	90	73	97.5	74	94	75	82	60
28	65	42	60	40	65	29	73	45	79	66	70	64	84	56	93	73	90	74	99.5	68.5	96	75	77	56
29	66	37	65	36	72	38	75	34	.....	.....	81	66	82	52	81	70	90	74	103	68	97	73	82	54
30	74	47.5	75	52	54	35	76	39	.....	.....	84	72	84	56	83	72	89	74	101	70	102	76	84	58
31	69.5	57	.....	.....	66	36	56	43	.....	.....	77	42	.....	.....	86	70	.....	.....	97.5	74	101	70	.....	.....
Range	56° 5		55°.5		57°		56°		51°		49°		59°		44°		29°		35°		34°		41°	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

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Maximum, minimum, and mean temperatures—Continued.

SANDY HOOK, N. J.

Day of month.	1873						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1							*44	*21	21	11	48	26	32	22	60	38	72	53	78	61	85	63	80	64
2							44	33	24	10	52	30	40	28	58	38	65	50	79	63	85	63	84	61
3							49	36	30	13	48	33	48	31	63	33	62	49	80	63	76	56	85	65
4							61	41	32	21	62	33	40	18	56	38	68	64	82	62	75	57	68	54
5							47	31	28	15	44	27	36	12	56	41	74	54	72	61	77	67	71	60
6							44	31	22	12	38	25	57	34	57	38	75	57	74	58	87	67	76	63
7							53	41	23	13	37	28	44	33	57	35	78	58	79	57	82	63	80	62
8							52	34	29	9	44	28	46	32	70	35	82	66	91	63	73	63	77	63
9							46	30	29	12	33	22	43	35	80	42	83	64	84	64	75	63	75	61
10							48	29	29	18	33	17	44	33	89	56	81	64	90	66	83	64	84	59
11							43	28	31	18	34	21	56	25	72	43	71	58	86	67	82	66	86	65
12							36	25	33	18	33	17	38	19	53	41	80	56	84	64	82	67	76	62
13							32	22	47	27	27	12	45	21	77	42	70	55	83	67	85	69	70	62
14							32	21	52	31	38	18	65	30	73	50	75	55	89	66	71	64	75	62
15							27	9	38	28	42	18	64	42	55	45	79	55	93	67	76	61	77	60
16							22	7	49	30	42	25	59	39	63	45	77	58	84	68	80	62	72	63
17							24	11	36	16	43	33	49	32	75	51	77	64	83	62	76	61	69	60
18							36	12	30	14	51	36	50	31	62	49	76	62	85	62	83	60	70	61
19							38	29	39	28	61	36	50	30	69	44	70	54	84	66	83	65	66	60
20							38	24	43	35	67	37	44	37	67	43	69	52	89	65	89	65	70	58
21							40	26	48	33	52	31	54	36	63	46	82	57	80	67	88	71	67	53
22							61	34	44	34	51	37	52	35	68	46	86	61	83	63	79	65	65	52
23							63	36	71	34	38	23	45	34	70	43	85	65	84	63	69	58	72	52
24							38	24	47	26	32	12	53	36	66	46	80	64	82	62	75	61	74	56
25							31	13	31	21	52	16	45	36	63	49	87	59	81	61	72	60	76	57
26							24	8	35	19	60	36	45	32	63	52	86	63	82	62	71	55	77	61
27							43	21	38	22	51	30	56	36	75	48	78	61	81	66	72	56	70	58
28							48	32	39	22	48	32	44	30	70	53	87	62	82	64	74	59	64	54
29							38	23	.....	.....	47	28	40	31	74	53	97	68	77	66	73	57	65	55
30							38	18	.....	.....	54	28	62	30	68	53	89	67	82	61	76	58	64	47
31							32	12	.....	.....	42	27	.....	.....	73	52	.....	.....	85	63	79	60	.....	.....
Range							56°		62°		55°		53°		56°		48°		36°		34°		39°	
Monthly means							32°.6		28°.6		34°.8		38°.2		54°.1		66°.3		73°.1		70°.2		67°.2	

* Station supplied with maximum and minimum thermometers January 1, 1874.

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Maximum, minimum, and mean temperatures—Continued.

SAN DIEGO, CAL.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																			68	59	77	64	71	64
2																			69	60	75	64	72	63
3																			73	60	74	65	73	62
4																			73	63	74	65	73	61
5																			72	62	74	62	72	64
6																	70	57	73	62	73	64	71	63
7																	71	60	74	60	73	62	71	58
8																	71	59	75	61	75	65	71	58
9																	73	57	75	65	75	63	70	62
10																	70	57	75	64	73	65	71	57
11																	74	57	77	62	71	63	74	57
12																	70	58	74	64	74	61	74	58
13																	69	59	73	64	76	61	75	56
14																	68	55	73	64	83	61	74	58
15																	69	59	74	63	81	65	74	57
16																	69	59	73	65	81	65	74	61
17																	69	58	74	64	75	64	71	60
18																	70	59	75	65	71	61	70	61
19																	72	57	74	65	71	62	69	57
20																	76	57	75	65	71	63	69	58
21																	71	61	73	67	75	60	70	61
22																	68	53	77	68	75	61	68	54
23																	68	55	78	68	77	63	69	59
24																	68	52	72	65	74	63	68	62
25																	69	57	71	62	71	62	68	59
26																	67	57	72	65	71	62	68	60
27																	69	55	72	63	71	50	77	58
28																	64	56	70	62	72	63	78	59
29																	68	56	70	63	75	62	75	61
30																	68	58	75	65	73	66	71	62
31																			75	64	71	65		
Range																			20°		33°		24°	
Monthly means	62°		60°. 2		54°. 6		54°. 8		52°. 2		52°		56°		61°		63°. 5		68°. 7		66°. 2		65°. 3	

* Station supplied with maximum and minimum thermometers June 6, 1874.

Digitized by Google

Maximum, minimum, and mean temperatures—Continued.

SAN FRANCISCO, CAL.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1																			66	52	65	52	83	52
2																	*63	49	66	52	65	52	87	56
3																	62	48	66	51	65	52	65	55
4																	62	49	65	52	63	52	68	55
5																	62	48	65	51	66	51	67	58
6																	69	51	65	51	65	54	65	56
7																	63	53	65	52	71	53	66	57
8																	64	52	73	54	68	52	65	54
9																	71	51	68	54	67	52	67	53
10																	71	59	63	52	63	53	69	53
11																	71	55	62	51	63	53	72	54
12																	72	53	63	51	66	55	73	53
13																	82	58	64	53	68	56	80	57
14																	68	55	62	52	64	54	89	61
15																	62	52	64	51	67	55	75	57
16																	62	51	61	51	61	53	73	55
17																	66	51	62	52	62	54	74	56
18																	63	50	61	52	64	54	62	52
19																	61	50	60	50	60	53	60	52
20																	69	51	60	49	61	54	63	53
21																	70	53	60	50	70	52	64	53
22																	62	54	60	51	65	53	64	53
23																	67	52	63	52	66	54	62	52
24																	60	51	63	52	65	55	62	51
25																	63	51	66	54	71	54	78	50
26																	63	52	66	56	66	55	64	52
27																	63	52	66	54	65	56	62	54
28																	63	53	63	53	64	54	62	53
29																	75	52	65	54	62	52	67	52
30																	62	51	65	53	61	53	67	52
31																			64	53	64	52		
Range																			24°		49°		49°	
Monthly means	59°.1		57°.4		50°.6		48°.9		50°.9		50°.6		54°.7		57°.7		59°.2		57°.7		58°.7		60°.8	

* Station supplied with maximum and minimum thermometers June 2, 1874.

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Maximum, minimum, and mean temperatures—Continued.

SANTA FÉ, N. M.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	67	46	61	39	55	31	50	25	39	20	44	20	45	19	71	45	73	45	86	54	87.5	61	82	52
2	73	48	58	28	48	28	56	32	37	10	52	29	50	30	55	33	46	45	83	52	89	61	69.5	58
3	75	48	60	30	32	6	42	15	41	23	44	28	62	32	59	30	82	53	83	52	84.5	60	65	52
4	71	46	57	39	32	12	23	4	38	23	44	23	63	36	66	28	82	48	83	56	83.7	66	69.5	44
5	77	40	57	30	47	24	31	2	32	11	40	20	62	33	73	44	82	48	85	56	84	60	76.5	48
6	6	36	63	32	39	26	42	13	36	9	36	15	62	30	76	45	83	52	80	57	81	57	78	50
7	75	46	64	36	43	24	46	22	46	16	45	19	47	27	77	51	88	52	81	56	85	52.5	78	49
8	69	42	60	36	43	16	48	24	46	21	48	19	46	21	70	48	87	52	83	57	87	62	81	51
9	73	46	64	36	44	30	46	23	47	22	58	32	54	25	50	30	87	52	87	57	84.5	61	81	52
10	76	42	64	35	43	35	42	20	49	25	56	36	61	32	58	28	82	48	82	62	82.5	53	79.5	49
11	69	43	66	33	40	20	42	21	46	26	50	27	60	35	66	36	69	44	82	61	77.5	53	78.5	54
12	73	45	59	23	26	13	46	29	44	28	56	30	54	31	64	44	74	48	87	55	85	57.5	72	56
13	71	39	58	26	38	10	46	30	42	21	56	37	56	32	72	44	81	50	88	59	81	56.5	72	52
14	70	49	64	32	42	14	47	24	44	26	50	26	56	35	74	40	80	48	88	60	84.5	56	70	42.5
15	65	43	62	38	44	20	45	20	42	32	47	27	49	25	68	38	79	50	79	57	83	55	71	41
16	65	40	56	35	47	22	52	37	41	28	37	23	36	23	74	45	84	53	78	56	87.5	55	74	47
17	58	33	60	35	40	20	48	35	42	22	41	20	35	22	79	43	79	46	80	57	85	56	73	43
18	56	30	52	22	34	17	51	37	36	32	38	23	34	22	78	50	85	54	83	56	84.5	49	72	44
19	60	28	54	27	42	15	38	33	36	18	37	14	53	24	82	50	86	55	78	56	86	60	68	37
20	67	33	52	26	34	18	42	25	38	16	41	21	53	32	83	52	89	61	78	58	84	55	75	46
21	63	35	48	27	43	13	36	20	30	11	47	21	51	29	85	52	88	58	80	56	85	57	77.5	50
22	47	30	47	31	40	10	30	13	25	2	44	21	36	22	86	52	88	58	83	58	82.5	55	64.5	42
23	54	18	42	23	33	18	34	15	28	14	42	30	42	21	79	51	82	58	85	59.5	80.5	62	64	37
24	63	36	48	23	37	10	37	11	24	3	45	27	54	21	75	50	82	55	85	57.5	70.5	52	66	42
25	56	41	57	30	45	18	42	14	37	0	50	32	65	29	71	48	86	55	85	52.5	70	54	71.5	41
26	50	23	53	27	50	18	42	22	47	15	56	28	70	37	74	50	85	59	79.5	54	71	55	74.5	45
27	47	20	52	28	46	15	40	32	36	26	58	31	70	37	78	48	82	55	75	55	72.5	52	74	41
28	58	27	52	24	49	21	44	19	44	24	62	34	73	41	75	45	82	49	78	57.7	73.5	50	76	43
29	56	29	56	27	50	21	48	25	.....	.....	62	37	78	45	75	48	81	62	82.5	59.5	78.5	54	75	47
30	66	33	60	32	53	23	54	29	.....	.....	51	34	78	42	72	48	86	48	87.7	62.5	80.5	49	75	47
31	55	31	.....	.....	52	25	36	24	.....	.....	45	26	.....	.....	73	46	.....	.....	88	59.5	79.5	53	.....	.....
Range	59°		44°		49°		54°		49°		47°		59°		58°		44°		36°		40°		45°	
Monthly means	51°		41°.1		25°.8		31°		27°.8		36°.2		42°.1		59°.8		69°.3		71°.1		69°.9		60°.6	

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Maximum, minimum, and mean temperatures—Continued.

SAUGEEN, CANADA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	22	4	39	23	18	2	42	25	31	1	44	31	52	43	82	47	70	54	73	44
2	.....	.....	49	23	46	7	40	32	15	0	46	32	33	19	40	31	59	32	63	49	63	54	82	53
3	.....	.....	.....	16	55	36	68	39	23	12	48	32	29	12	58	24	75	53	71	44	64	35	77	41
4	.....	.....	.....	18	55	20	55	24	24	14	36	16	22	6	67	33	71	49	71	57	68	42	73	38
5	.....	.....	.....	14	30	12	25	17	20	4	36	15	36	7	55	33	70	56	68	48	73	44	79	56
6	.....	.....	.....	14	34	12	28	17	21	10	38	24	42	21	41	25	68	56	80	55	76	55	71	50
7	.....	.....	46	20	21	8	32	26	27	8	42	30	36	20	46	24	75	51	86	58	75	55	82	49
8	.....	.....	.....	26	46	15	39	22	28	3	37	22	39	22	59	35	64	46	76	56	74	49	75	55
9	.....	.....	37	27	46	22	34	24	30	19	27	16	35	22	82	58	65	49	79	52	79	54	81	56
10	.....	.....	38	28	43	21	35	29	25	9	26	16	36	16	74	53	65	42	76	58	80	59	82	60
11	.....	.....	36	20	38	19	32	22	28	8	25	13	37	17	74	52	72	52	68	50	89	56	82	57
12	.....	.....	37	15	35	21	24	16	45	17	21	4	31	11	72	45	65	42	66	56	82	59	86	58
13	.....	.....	29	5	31	11	23	12	48	25	24	5	57	24	64	40	62	40	72	55	71	50	86	60
14	.....	.....	27	1	37	16	23	9	32	20	26	7	57	43	58	34	69	47	87	61	71	42	84	59
15	.....	.....	34	15	36	20	10	4	44	23	41	10	51	26	65	43	70	50	84	57	71	44	80	54
16	.....	.....	36	16	45	22	19	5	34	19	49	24	35	24	50	38	74	55	62	44	75	45	65	42
17	.....	.....	38	22	46	22	25	11	24	4	46	33	46	24	45	35	60	47	72	41	86	59	69	41
18	.....	.....	33	17	44	23	40	19	30	3	56	36	56	24	45	34	65	41	81	60	74	48	74	60
19	.....	.....	26	10	41	29	38	12	38	18	57	24	45	29	53	30	74	44	89	59	83	50	84	58
20	.....	.....	22	7	32	18	23	3	30	17	37	25	57	31	52	38	71	52	65	41	79	60	65	47
21	.....	.....	26	8	25	18	40	31	32	18	44	24	41	29	48	36	76	57	68	39	68	57	61	40
22	.....	.....	37	13	29	22	41	31	35	23	38	5	44	24	59	31	82	59	75	47	72	49	65	47
23	.....	.....	38	17	39	21	32	22	40	18	24	9	35	24	63	40	76	57	79	53	70	48	73	47
24	.....	.....	36	19	37	29	27	13	23	8	27	10	37	20	73	59	70	53	81	62	68	43	76	53
25	.....	.....	30	7	39	29	17	5	18	2	40	24	57	28	78	32	79	55	84	67	72	45	75	54
26	.....	.....	25	2	36	30	30	6	25	0	42	19	46	30	50	40	69	52	80	54	74	45	78	59
27	.....	.....	24	4	37	25	37	27	28	15	30	15	33	24	75	39	75	51	68	54	76	52	71	52
28	.....	.....	34	12	29	24	34	19	38	16	20	12	35	27	78	53	91	63	72	53	83	53	65	50
29	.....	.....	28	10	29	17	30	8	.....	.....	31	12	35	21	63	51	81	43	67	47	80	52	66	46
30	.....	.....	23	5	30	12	11	— 4	.....	.....	39	15	41	27	81	50	64	47	80	45	78	50	61	43
31	.....	.....	.....	.....	32	25	16	— 4	.....	.....	19	8	.....	.....	71	44	.....	.....	73	58	67	49	.....	.....
Range	.....	.....	.....	.....	51°		72°		48°		53°		56°		57°		59°		50°		54°		48°	
Monthly means	.....	.....	.....	.....	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

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Maximum, minimum, and mean temperatures—Continued.

SAVANNAH, GA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	60	36	69	48	56	52	75	66	80	52	95	73	86	75	92	73	77	72
2	.....	.....	.....	.....	.....	.....	62	43	57	50	63	49	71	56	81	58	94	75	87	75	96	76	83	69
3	.....	.....	.....	.....	.....	.....	66	53	54	41	68	49	68	50	83	58	89	75	83	70	92	75	84	71
4	.....	.....	.....	.....	.....	.....	70	59	55	39	76	53	75	49	75	61	86	76	85	70	89	72	83	70
5	.....	.....	.....	.....	.....	.....	66	58	53	37	66	53	67	52	71	56	85	74	94	73	84	70	85	70
6	.....	.....	.....	.....	.....	.....	71	60	67	45	75	51	82	59	69	51	90	76	83	68	84	72	84	68
7	.....	.....	.....	.....	.....	.....	59	40	56	49	79	62	82	65	74	55	90	75	83	69	87	72	85	70
8	.....	.....	.....	.....	.....	.....	51	35	50	37	64	47	82	64	79	59	92	76	83	71	84	70	87	70
9	.....	.....	.....	.....	.....	.....	59	35	55	36	67	43	75	65	78	58	93	75	87	73	86	73	90	69
10	.....	.....	.....	.....	.....	.....	61	45	56	36	70	48	65	54	78	60	95	79	88	73	89	73	80	67
11	.....	.....	.....	.....	.....	.....	68	46	61	38	62	47	64	46	77	63	89	75	87	73	95	72	77	66
12	.....	.....	.....	.....	.....	.....	56	46	63	38	60	43	69	47	70	63	92	74	85	70	95	77	83	67
13	.....	.....	.....	.....	.....	.....	54	46	71	52	59	43	64	49	71	63	80	69	85	71	88	70	82	72
14	.....	.....	.....	.....	.....	.....	54	45	64	57	57	37	75	58	74	66	80	70	87	75	87	74	84	72
15	.....	.....	.....	.....	.....	.....	46	34	61	50	58	47	78	64	81	66	80	71	87	73	85	70	88	73
16	.....	.....	.....	.....	.....	.....	41	31	67	51	73	55	83	65	87	63	86	74	92	71	84	72	87	72
17	.....	.....	.....	.....	.....	.....	41	29	61	44	76	63	78	67	84	65	91	73	92	74	83	69	90	70
18	.....	.....	.....	.....	.....	.....	61	38	48	40	82	60	70	62	83	63	88	66	89	74	84	69	90	70
19	.....	.....	.....	.....	.....	.....	63	43	53	39	80	63	80	63	74	63	88	66	81	73	87	76	87	73
20	.....	.....	.....	.....	.....	.....	71	45	72	48	83	63	83	68	80	62	91	73	82	72	88	75	87	73
21	.....	.....	.....	.....	.....	.....	64	51	75	57	83	65	84	67	88	67	87	73	85	73	89	76	81	70
22	.....	.....	.....	.....	.....	.....	72	55	74	55	83	64	82	61	74	65	86	72	90	74	93	76	81	66
23	.....	.....	.....	.....	.....	.....	73	59	78	62	74	58	84	61	79	62	88	73	89	74	93	73	81	64
24	.....	.....	.....	.....	.....	.....	69	46	68	46	61	49	83	67	89	65	95	72	84	72	85	76	78	64
25	.....	.....	.....	.....	.....	.....	53	36	50	42	60	46	79	58	95	71	99	75	86	70	82	71	81	68
26	.....	.....	.....	.....	.....	.....	50	35	51	38	64	58	74	53	95	71	96	73	83	74	82*	66	82	67
27	.....	.....	.....	.....	.....	.....	63	36	61	43	74	56	74	54	89	72	96	72	85	72	79	67	82	68
28	.....	.....	.....	.....	*47	*30	68	52	66	55	82	59	78	60	85	67	88	72	86	73	75	66	75	64
29	.....	.....	.....	.....	53	32	55	39	.....	.....	78	61	63	48	88	69	89	74	88	70	76	65	75	57
30	.....	.....	.....	.....	48	33	64	35	.....	.....	79	65	71	46	94	70	88	74	85	74	84	71	78	57
31	.....	.....	.....	.....	47	26	67	43	.....	.....	86	63	.....	.....	87	72	.....	.....	86	74	81	71	.....	.....
Range	.....		.....		.....		44°		42°		49°		38°		44°		33°		26°		31°		33°	
Monthly means	63°. 4		55°. 3		51°. 8		52°. 4		53°. 3		62°. 2		66°		72°. 2		80°. 7		79°		79°		75°. 3	

* Station supplied with maximum and minimum thermometers December 28, 1873.

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Maximum, minimum, and mean temperatures—Continued.

SHREVEPORT, LA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	74	94	76	94	71
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	72	96	78	94	70
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*94	*71	94	73	95	79	94	74
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	70	87	72	97	76	90	71
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	71	86	71	97	77	85	72
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	72	88	74	98	78	83	70
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	73	94	72	99	79	88	74
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	72	97	71	97	79	87	73
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	75	92	74	97	80	87	74
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	74	81	73	101	79	84	72
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	74	91	73	97	78	88	70
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	63	92	72	100	80	90	71
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	63	93	72	100	77	89	67
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	72	86	72	98	77	88	69
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	72	86	70	99	77	82	71
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	73	88	68	97	76	81	68
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	72	90	69	95	76	86	66
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	74	91	72	90	71	90	70
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	70	92	74	87	71	77	68
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	73	93	74	86	74	78	60
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	71	93	74	91	75	80	56
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	69	93	76	94	78	80	59
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	72	94	76	97	73	84	68
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	71	95	76	89	72	80	69
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	72	94	78	92	76	82	70
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	95	75	95	76	94	76	85	69
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	95	75	96	73	95	76	78	63
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	96	74	94	76	95	71	86	56
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	74	88	73	95	78	79	56
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	96	75	90	66	97	75	85	57
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	68	93	70	.....	.....
Range	.....		.....		.....		.....		.....		.....		.....		.....		.....		31°		31°		38°	
Monthly means	62°.6		56°.5		49°.9		50°.4		51°.6		60°.5		61°		75°.2		82°.7		82°.5		86°		75°.4	

*Station supplied with self-registering maximum and minimum thermometers June 3, 1874.

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Maximum, minimum, and mean temperatures—Continued.

SQUAN BEACH, N. J.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	25	.....	45	22	35	29	62	37	77	54	72	62	90	65	76	58
2	.....	.....	.....	.....	.....	.....	.....	.....	31	.....	45	24	38	32	55	40	60	43	75	63	83	64	78	52
3	.....	.....	.....	.....	.....	.....	.....	.....	34	.....	48	32	50	34	55	30	59	54	77	63	76	51	90	56
4	.....	.....	.....	.....	.....	.....	(†)	.....	32	.....	67	35	50	22	55	35	67	57	76	57	71	51	70	60
5	.....	.....	.....	.....	.....	.....	45	.....	29	.....	41	29	40	15	50	43	65	58	77	61	74	54	72	63
6	.....	.....	.....	.....	.....	.....	46	.....	25	.....	38	30	60	38	50	37	73	60	69	58	76	52	73	61
7	.....	.....	.....	.....	.....	.....	51	.....	27	.....	40	36	43	37	53	37	72	59	70	56	78	63	86	58
8	.....	.....	.....	.....	.....	.....	47	.....	32	.....	45	30	42	32	70	35	91	58	78	63	71	62	76	56
9	.....	.....	.....	.....	.....	.....	45	.....	32	.....	37	25	43	35	82	46	78	67	80	65	73	63	74	61
10	.....	.....	.....	.....	*50	30	49	.....	30	.....	37	17	45	34	88	64	78	66	73	65	85	59	82	52
11	.....	.....	.....	.....	50	21	45	.....	32	.....	38	25	57	27	69	44	68	63	78	58	80	66	80	60
12	.....	.....	.....	.....	75	35	40	.....	37	.....	36	20	41	22	49	42	83	63	73	54	78	67	75	63
13	.....	.....	.....	.....	60	36	36	.....	44	.....	28	16	37	20	64	42	71	53	84	55	78	67	69	63
14	.....	.....	.....	.....	42	23	35	.....	51	.....	40	21	54	33	70	61	73	44	80	58	70	64	71	65
15	.....	.....	.....	.....	45	20	21	.....	39	.....	37	20	61	43	70	47	74	47	85	65	74	59	76	65
16	.....	.....	.....	.....	49	28	22	.....	52	.....	40	24	58	39	60	48	70	58	91	63	77	55	72	68
17	.....	.....	.....	.....	50	28	27	.....	35	.....	45	25	44	35	70	53	81	59	73	61	74	59	70	65
18	.....	.....	.....	.....	54	26	37	.....	31	.....	47	40	41	32	60	44	80	60	77	57	89	61	70	65
19	.....	.....	.....	.....	48	25	41	.....	41	.....	57	40	45	30	68	41	74	55	76	60	79	56	69	66
20	.....	.....	.....	.....	45	25	36	.....	44	.....	49	40	42	40	62	46	65	54	81	62	94	65	69	60
21	.....	.....	.....	.....	35	15	40	.....	50	.....	47	31	60	38	62	49	68	61	78	60	84	69	69	52
22	.....	.....	.....	.....	34	10	51	.....	48	.....	55	39	50	33	69	45	75	57	75	58	78	60	65	46
23	.....	.....	.....	.....	39	20	62	.....	75	.....	50	24	44	36	70	38	93	64	80	54	70	67	70	45
24	.....	.....	.....	.....	50	26	40	.....	38	.....	35	15	47	35	64	49	86	58	78	56	72	61	74	49
25	.....	.....	.....	.....	50	25	29	.....	32	.....	52	15	43	38	61	49	86	59	77	54	68	65	79	53
26	.....	.....	.....	.....	55	36	27	.....	33	.....	57	36	46	36	71	50	86	68	77	65	66	61	73	54
27	.....	.....	.....	.....	55	35	42	.....	36	.....	45	32	56	35	65	47	70	63	74	63	69	62	71	51
28	.....	.....	.....	.....	(†)	.....	52	.....	39	.....	49	32	42	38	64	53	75	58	77	63	70	56	65	60
29	.....	.....	.....	.....	.....	.....	40	.....	.....	.....	41	31	40	32	66	50	84	68	74	64	70	51	66	55
30	.....	.....	.....	.....	.....	.....	37	.....	.....	.....	55	31	53	30	60	53	81	66	82	58	71	48	66	49
31	.....	.....	.....	.....	.....	.....	40	.....	.....	.....	41	30	.....	.....	66	55	.....	.....	82	56	73	53	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52°		46°		58°		48°‡		37°		42°		45°	
Monthly means	.....	.....	.....	.....	37°.6		34°		31°		36°.7		40°		54°.2		67°.2		69°.2		68°.8		66°.4	

* Station opened December 10, 1873.

† Maximum and minimum thermometers not in position.

‡ Minimum thermometer out of order.

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Maximum, minimum, and mean temperatures—Continued.

STAYNER, CANADA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	40	25	20	9	38	20	.....	.....	.....	.....	24	4	51	35	64	36	81	43	70.1	53.2	76.1	44.2
2	.....	.....	.....	.....	43	10	38	25	13	—10	51	26	40	20	50	26	67	33	69	51	.....	.....	84.1	49.7
3	.....	.....	38	23	51	35	50	35	21	9	47	35	20	10	.....	.....	75	50	77	44	66.1	42.2	73.1	44.2
4	.....	.....	50	24	55	23	.....	.....	25	15	36	13	22	— 4	60	36	75	55	65	53	71.1	43.2	74.1	39.3
5	.....	.....	33	23	25	20	62	20	18	5	35	12	.....	.....	53	30	76	55	.....	.....	78.1	44.2	77.1	52.2
6	.....	.....	39	21	30	15	24	18	18	0	30	10	40	20	41	23	80	56	88	56	82.1	50.2	.....	.....
7	.....	.....	44	25	.....	.....	33	21	28	— 6	38	19	41	21	43	31	.....	.....	90	60	75.1	57.2	84.1	55.2
8	.....	.....	45	28	43	19	35	22	.....	.....	.....	.....	45	20	56	40	79	52	94	60	80.1	51.2	81.4	48.2
9	.....	.....	(*)	.....	48	31	34	20	31	15	26	12	33	20	87	57	76	55	88	55	.....	.....	86.1	57.2
10	.....	.....	.....	.....	34	30	34	19	26	10	26	10	38	21	.....	.....	70	50	82	62	80.6	52.2	82.1	57.2
11	.....	.....	.....	.....	40	29	.....	.....	20	1	20	5	38	13	69	47	56	52	70	50	92.1	55.2	90.1	57.2
12	.....	.....	.....	.....	35	29	24	10	32	— 1	16	— 8	.....	.....	81	46	59	43	.....	.....	90.1	62.2	88.1	55.2
13	.....	.....	.....	.....	31	19	20	7	43	28	20	—17	53	13	76	45	70	44	76	50	69.1	55.2	.....	.....
14	.....	.....	.....	.....	.....	.....	22	5	39	19	30	8	60	38	56	38	.....	.....	91	68	73.1	45.2	91.1	57.2
15	.....	.....	.....	.....	36	19	21	3	.....	.....	.....	.....	49	20	76	33	70	45	88	65	81.1	46.2	75.1	58.2
16	.....	.....	.....	.....	44	28	13	— 2	39	19	45	23	32	20	61	38	74	57	67	49	.....	.....	64.1	48.2
17	.....	.....	31	26	41	23	24	3	20	0	46	23	40	24	.....	.....	72	51	80	43	90.1	54.2	61.1	43.2
18	.....	.....	30	23	39	30	.....	.....	24	— 5	59	39	55	21	53	34	72	46	90	62	72.1	44.2	74.1	59.2
19	.....	.....	24	18	34	30	36	11	38	14	50	28	.....	.....	55	33	80	49	.....	.....	82.1	56.2	79.1	49.2
20	.....	.....	24	7	30	18	15	— 7	37	21	35	22	50	22	58	34	80	50	80.1	45.2	79.1	61.2	.....	.....
21	.....	.....	28	9	.....	.....	37	13	35	19	44	23	45	21	60	40	.....	.....	72.1	41.2	66.1	59.2	59.1	38.2
22	.....	.....	32	9	29	12	48	35	.....	.....	.....	.....	48	26	63	33	90	58	82.1	48.2	72.1	48.2	64.1	41.2
23	.....	.....	.....	.....	37	19	32	20	39	20	13	5	36	25	75	37	79	59	84.1	53.2	.....	.....	73.1	48.2
24	.....	.....	35	25	35	24	24	7	20	8	25	9	44	20	.....	.....	66	53	90.1	57.2	71.1	44.2	77.6	51.2
25	.....	.....	25	17	36	26	.....	.....	20	10	42	22	45	22	65	41	79	55	91.1	62.2	75.1	43.2	78.1	53.2
26	.....	.....	28	10	34	29	26	2	25	— 2	41	19	.....	.....	60	34	70	52	.....	.....	71.1	45.2	78.1	59.2
27	.....	.....	21	7	35	25	37	19	27	9	32	14	34	22	87	34	90	49	71.1	56.2	83.1	55.2	.....	.....
28	.....	.....	25	10	.....	.....	34	17	40	9	32	10	36	26	93	51	.....	.....	74.1	58.2	80.1	44.2	64.1	45.2
29	.....	.....	24	10	31	15	30	— 2	.....	.....	.....	.....	38	20	79	53	81	56	75.1	54.2	83.6	45.2	65.1	43.2
30	.....	.....	.....	.....	25	7	30	— 6	.....	.....	35	18	45	36	88	53	70	47	85.1	47.2	.....	.....	65.1	38.7
31	.....	.....	.....	.....	32	23	14	— 9	.....	.....	20	9	.....	.....	.....	.....	.....	.....	76.1	60.2	78.1	46.2	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

* No observations taken. No observations taken on Sundays.

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Maximum, minimum, and mean temperatures—Continued.

SAINT LOUIS, MO.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max.	Min.	Max.	Min.	Max.	Min.
1	66	48	50	26	63	43	49	37	31	27	46	39	43	27	81	44	80	67	89	72	82	70	83	61
2	72	47	52.5	44	64	58	54	38	31	26	60	38	48	33	76	66	84	62	90	71	82	66	83	66
3	74	59	49	33	62	26	65	54	34	25	70	43	68	32	77	50	88	67	93	73	83	65	77	64
4	68	57	60	37	31	13	63	17	32	29	48	33	45	30	57	44	91	71	97	75	85	65	76	60
5	67	44	55	37	32	25	28	11	35	25	49	36	39	34	65	44	94	68	98	78	78	65	76	62
6	51	36	58	33	33	28	35	20	38	31	63	47	43	32	71	49	93	72	100	79	88	68	87.5	64.5
7	59	39	63	45	39	33	40	21	38	24	54	36	50	33	77	52	95	76	100	79	85.5	73	87	69.5
8	68	44	65	42	58	38	51	32	42	27	43	25	53	39	83	60	94	74	90	75	85	71	86	70.5
9	77	50	61	41	50	32	45	36	37	21	55	32	45	31	82	59	94	75	82	72	89.5	70	86	71.5
10	80	56	59	40	44	29	44	35	52	28	49	35	58	33	82	61	90	69	89	72	100	70	88	72
11	72	57	53	43	67	42	36	21	61	41	43	29	75	43	74	59	74	62	84	66.5	101	79	89	71
12	62	45	43	29	62	30	32	17	62	48	40	28	64	37	76	62	74	55	85	64	98	82	90	70
13	71	46	45	25	34	22	37	22	58	26	39	19	65	51	81	63	76	57	92	72	92	78	88	67
14	77	49	45	23	43	27	23	6	47	27	46	29	74	54	81	62	85	62	94.5	74.5	83	64	87	71
15	76	53	71	40	49	31	13	−1	62	39	47	39	57	41	75	62	78	67	91	70	85	68	68	52
16	71	61	60	45	52	33	26	10	50	32	53	42	49	35	68	51	81	64	83	68	89	65.5	71	51
17	73	62	50	38	54	40	43	19	40	30	71	49	52	34	67	56	87	66.5	81.5	68	90	68	78	62
18	58	47	48	22	54	35	47	40	38	25	77	58	59	42	66	52	87	68	88	69.5	92	73	85	63.5
19	51	37	25.5	13.5	37	28	50	35	55	35	61	30	61	48	75	51	90	68	93	74	94	74	77	56
20	53	37	44	20	29	18	51	33	50	35	54	38	62	45	75	58	90	71	93	75	93	77	67	51.5
21	60	36	47	33	30	10	65	51	41	37	62	44	55	40	68	52	92	69	86	71	93	78	66	54.5
22	62	37	47	35	34	25	53	41	41	33	58	33	50	44	75	52	95	72	84	67	93	73	74	54.5
23	45	32	50	36	42	32	41	22	39	16	46	28	47	37	86	60	94	72	93	76	78	69	79	57
24	53	33	48	33	39	30	35	14	30	11	40	21	50	37	92	69	94	77	97	81	81	64	69	64.5
25	58	37	47	34	37	33	41	23	30	22	62	33	61	37	82	70	92.5	77	99	80.5	84	65	75	66
26	55	40	57	32	38	28	50	35	50	24	53	35	58	42	85	65	94	76	97	81	82	67	79.5	63.5
27	50	32	32	29	30	24	49	40	42	28	35	27	66	50	90	70	95	79	82	72	81	67	68.5	53.5
28	36	26	33	19	39	19	40	21	46	35	43	26	55	32	89	74	96	71	79	62	80	70	68	49.5
29	45	26	38	18.5	34.5	21	59	33	.....	.....	43	32	58	32	83	70	83	70	83	64.5	82	70	77	51
30	53	33	48	19	36	17	50	27	.....	.....	53	37	79	43	87	70	86	68	89	69	77	66	70	52.5
31	38	25	.....	.....	44	27	29	21	.....	.....	43	31	.....	.....	93	73	.....	.....	81	72	72	63	.....	.....
Range	55°		57°.5		57°		66°		51°		58°		59°		49°		41°		38°		38°		40°.5	
Monthly means	52°.3		41°.8		37°.2		35°.5		36°.6		43°.1		47°.6		69°.5		79°.2		81°.5		78°.3		70°.2	

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Maximum, minimum, and mean temperatures—Continued.

SAINT PAUL, MINN.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	52	30	38	11	35	25	39	20	20	1	43	15	46	15	55	43	74	50	79	60	79	55	85	58
2	57	35	34	17.5	35	21	43	25	25	9	46	30	28	12	64	40	64	55	79	61	75	57	74	55
3	44.5	39	42	10	21	8	38	6.5	24	10	38	14	24	17	62	37	71	53	94	66	74	56	67	44
4	51	38	29	19	8	— 8	6.5	— 8	22	9	22	6	25	7	62	31	79	55	94	71	79	61	66	51
5	35	42	27	14	2	—14	22	— 1.5	23	— 3	31	18	36	19	70	37	73	51	96	70	78	62	74	48
6	47	25	41.5	20	15.5	—11	30	14	28	15	31	26	38	23	71	41	73	56	99	67	82	63	88	55
7	67	35	42	28	28	15	37	10	26	12	29	10	45	17	80	43	72	56	90	68	86	62	92	64
8	71	44	44	25	35.5	23	34	18	26	10	22	0	38	24	90	54	81	63	88	69	86	61	91	67
9	66	50	34	29	23	29	32	13	23	— 3	26	6	43	18	88	65	69	55	85	65	88	66	86	68
10	63	47	41	31	29.5	1	14	7	26	8	25	16	57	28	77	62	58	47	76	61	90	65	77	69
11	56	42	34.5	27	30	16	10	2	29	3	20	2	43	23	70	54	56	47	80	57	91	71	85	64
12	60	33	20	14	17.5	9	15.5	— 1	27.5	13	16	— 5	51	23	62	45	71	42	82	61	81	66	73	54
13	65	42	21	14	20	1	15.5	—11	13	— 6	23	— 5	53	28	68	38	72	54	89	64	77	55	72	45
14	62	34	36	12	26.5	6.5	— 8	—23	21	— 1	34	12	47	32	60	44	62	52	91	70	76	60	64	45
15	73	52	47.5	24	39	16	2.5	—16.5	22	9	38	30	44	28	49	44	69	56	75	60	85	65	61	38
16	50	45	39	33	31.5	20.5	20	2.5	25	— 1	46	35	49	25	61	38	76	56	84	55	93	64	65	43
17	63	49	35	30	25	11	33	18.5	28	— 4	43	36	53	30	59	47	88	61	89	65	77	61	65	50
18	44.5	35	19	7	22	7	34	20	28	10	37	29	42	29	70	39	87	64	86	67	82	56	60	46
19	52	30	17	— 1	20	3	20	— 0.5	30	4	34	21	49	24	74	52	90	64	80	72	91	65	53	47
20	55	30	24	10	4.5	—12	28.5	10	27	—11	43	22	49	30	66	44	86	61	78	57	78	65	60	37
21	57	31	36	17	17	—10	30	5	19	— 1	33	17	47	28	73	51	90	64	85	53	70	62	62	46
22	37	22	27	13	36	16.5	6	— 6	13	5	30	9.5	40	23	62	52	90	70	88	60	68	57	72	49
23	35	18	32.5	13	36	34	6	— 9.5	12	— 3	17	0	43	21	88	53	94	73	86	68	77	51	76	45
24	39.5	24	39	21	34	31	3.5	—18	3	—18	38	5	57	29	68	59	92	71	90	63	79	62	79	52
25	34	28	28	23	33	26	7.5	—13	10	—15	40	25	50	39	77	53	90	66	93	67	83	58	68	55
26	34	29	27	21	28	18.5	33	7.5	24	3	25	8	50	28	90	54	86	66	75	61	75	59	64	52
27	31	23	21	2	18.5	10	34	24	36	4	27	11	44	40	94	64	91	65	77	53	75	52	57	47
28	29	20	15.5	— 5	28	9	20	5	33	7	22	7	53	34	92	70	81	60	88	59	75	66	71	42
29	29.5	18	23	10	23.5	5	14	8	.....	.....	32	10	60	37	90	67	82	53	87	63	76	65	65	45
30	29	18	26	17	28	3.5	10	4	.....	.....	30	19	71	40	82	67	80	62	88	62	75	54	67	37
31	26	17	.....	.....	34	19	15	— 4	.....	.....	25	11	.....	.....	78	53	.....	.....	86	65	81	54	.....	.....
Range	56°		52°.5		53°		61°		54°		51°		64°		63°		52°		46°		42°		55°	
Monthly means	41°.3		25°.6		18°.6		13°.8		14°.4		23°.7		37°.5		62°.2		68°.7		74°.7		70°.5		60°.9	

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Maximum, minimum, and mean temperatures—Continued.

SYDNEY, C. B.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	24.6	9	30.8	4.3	11.2	− 8	16.3	−23	26.3	9.5	49.8	32.4	49.4	36	48.6	42.8	66.4	50.5	74	55.3
2	.....	.....	.....	.....	26.6	16.4	38.2	17	7.7	− 8	31.8	− 4.4	30.4	16.4	51.5	31.5	41.8	28.8	60.6	44.8	76.4	59.3	60	57
3	.....	.....	.....	.....	41	13.3	39.4	33.3	18.5	−11.5	43.2	− ·7	33.4	24.4	40.4	29.4	65.8	27.2	64.1	43.7	72	56	66.5	56.4
4	.....	.....	.....	.....	55.4	39.6	44.3	33	35	18.5	47.8	36.2	38.3	18.3	49.9	31.5	67.9	47.5	54.2	43	70	50.2	62	44
5	.....	.....	.....	.....	55	32.7	48.5	31.2	18.8	0	47	27.8	26.1	12.6	49.8	28	73.3	49.2	56.3	43.4	69	49.6	71	42.6
6	.....	.....	.....	.....	32.7	21	32.4	19.2	0	− 8.5	28	20.5	39.3	13.5	44	25.5	68.3	46.2	55.5	46.5	61	52	71	48
7	.....	.....	.....	.....	28.3	19.5	40.8	25	3.9	− 8	34.5	24.3	43.7	31	54	22	59.2	46	69.8	45.4	68	54	65	59
8	.....	.....	.....	.....	23.9	11.9	48	32.2	16	− 2	36.4	29.8	42	30.5	54	32.5	71.7	43.2	69.2	49.4	75.5	52.8	63.7	49.5
9	.....	.....	.....	.....	38.8	16.6	51.3	34.5	26.6	14.8	35.6	30.2	37	27.8	58.2	35	54	43	75.2	52.6	71	57.4	62	44.6
10	.....	.....	.....	.....	39	15	39.4	31.6	28.7	2	36.8	19.4	29.7	24.5	45.5	30.5	55	39	71.4	48.4	73	59	64.9	46
11	.....	.....	.....	.....	20.3	13	38.4	31	27.7	21.4	38.2	25.1	31.9	19.5	45.5	30.5	52.3	37.2	77.4	47.6	75.4	58.6	57	44.3
12	.....	.....	.....	.....	34.2	17	36.8	7.4	23.2	13	35.2	27	39.6	21.3	51.8	28.6	59	36	73.7	50.1	82.8	59.9	53.6	47.3
13	.....	.....	.....	.....	29.9	21.7	28	18.6	25.9	6.5	30	21.7	28.4	10	68.5	27.5	50.9	41.5	73.3	51.4	80.7	57	59.8	34.4
14	.....	.....	.....	.....	29.3	19	29.8	15	45.5	24.5	39.9	21	40	8	67.6	42.4	54.7	35	79.8	54.4	62	56	69.6	31.9
15	.....	.....	.....	.....	19.9	9	33.8	8.7	38.7	20.3	37.4	26.5	51.6	28.5	50	30.4	65.6	34.4	79	60.1	63.6	56.6	72	54.6
16	.....	.....	35.4	21	29.7	14	22.8	4.5	32	22.3	44.3	18.2	49.5	31.5	60	25.7	66.7	40.6	87.9	61.6	66.5	47.2	70	52.4
17	.....	.....	36.2	27.2	37	27.7	20.4	5.6	35	26.2	50	23.7	35.5	27.5	62.7	37	54.7	41.2	66.5	54.6	72.8	43	58.7	49.4
18	.....	.....	55.9	31.2	36.4	31.5	27	4	26	17.5	44.3	20	42.8	24.8	59.5	45.5	52	43.6	73	45	74.8	55.4	53.3	46.5
19	.....	.....	54.2	41.8	34.3	24.8	38.1	24.6	33.3	8.6	52.2	32.2	49.3	23.5	57.3	42	44.6	41.5	78.8	41.8	69.9	48	55.5	47.4
20	.....	.....	41.8	31.4	33.2	23.4	39.2	15	40.9	23.5	52.4	24.5	38.4	27.3	70.6	44	45.3	40.4	76.6	53.2	70.4	43	68.8	53.6
21	.....	.....	34.5	31.2	32.9	13	19.1	3	36	26.7	27.4	18.2	31.9	25.5	65	45	51.3	41	71.7	56.2	68.6	56	71	57.4
22	.....	.....	41	22	16.4	11	36.2	14.4	38.1	19	37.3	18.9	37	25.5	59.5	43.4	67.6	45.4	72.4	49.4	68.8	46.2	63	37.8
23	.....	.....	40.8	23.5	21.7	9	46.4	35.5	24.8	12	29.9	13.5	41	20.5	59.4	40.4	78.4	51.5	71.6	42.6	64	42.4	57.3	35.4
24	.....	.....	27.1	22.5	27.9	7.9	45.5	16.9	32	11.3	23.3	9.4	38.3	13	60.3	31.4	57.7	46	78	43.2	67.7	42.2	59.3	33.2
25	.....	.....	42.9	24	31.5	15.6	20.7	12.8	15.6	6.4	26.7	6	51.6	23.8	62.8	28.8	57.7	38.7	81	51.4	67	39.1	63	32.2
26	.....	.....	35	27.6	20.6	6.5	20.6	−11	15	− 2.3	43.5	24.8	38.8	25	46.3	36.3	53.5	36.5	80.3	54.3	62	44	65.7	34.3
27	.....	.....	33.7	26	28.2	14.0	6	−10.6	25.4	− 8.6	38.8	22	30.9	28.2	68.7	45.3	69.6	36	77	47.6	63.2	50	65.0	32.0
28	.....	.....	39.3	24.2	39.3	10.5	44	5.3	16.4	−12.5	32	16	39.3	27	75.8	47.3	60.8	49	81.8	65	66	45.4	60.2	33.1
29	.....	.....	33	19.8	34.4	20.7	44.4	11.7	.....	.....	35.3	14	51.5	23.3	55	34	63.5	45	75	64	69	55	65.4	56.3
30	.....	.....	20.6	11	37.4	21	22	0	.....	.....	33.3	9.5	48.6	31.8	61.2	30.6	52.9	45	73	61.5	72	61.3	69.0	55.6
31	.....	.....	.....	.....	22.9	5.5	9.4	− 6	.....	.....	36.8	14.6	.....	.....	46	28.4	.....	.....	76	53.6	76	57	.....	.....
Range	.....	.....	.....	.....	49°.9		62°.3		58°		75°.4		43°.6		53°.8		51°.2		46°.1		43°.7		42°.1	
Monthly means	.....	.....	.....	.....	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

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Maximum, minimum, and mean temperatures—Continued.

TOLEDO, OHIO.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	62	44	42	28	36	28	44	19	21	15	53	36	41	17	57	35	64	54	85	61	80	67	77	55
2	61	41	48	26	56	35	46	37	27	10	56	33	47	29	54	39	64	47	79	61	76	58	83	57
3	72	50	46	32	60	54	60	44	28	19	57	43	42	26	48	38	79	58	78	59	72	57	71	57
4	64	57	58	34	59	24	63	27	34	25	44	30	32	14	47	41	87	65	93	68	70	54	69	52
5	64	47	47	31	30	21	32	19	30	23	36	27	34	24	59	42	86	65	77	60	72	54	74	63
6	48	36	43	26	29	20	33	27	25	20	38	33	44	26	57	39	81	67	92	60	75	60	79	56
7	57	30	55	34	37	27	36	29	28	18	47	29	49	33	63	33	88	70	97	74	79	63	88	64
8	68	42	52	43	54	34	40	28	30	13	29	24	49	34	80	46	75	64	90	76	79	62	91	66
9	67	44	46	34	55	32	40	32	33	19	36	24	37	29	83	62	86	61	85	70	84	63	86	66
10	77	51	41	32	40	35	36	28	39	15	39	22	50	25	84	63	71	58	85	70	86	70	83	63
11	65	50	41	34	55	36	33	23	32	25	40	19	45	25	83	50	81	61	75	60	93	69	86	60
12	50	38	38	25	47	36	31	21	53	26	30	18	40	25	86	51	65	52	76	58	92	77	88	61
13	61	36	32	22	38	29	30	20	53	36	29	15	63	32	81	59	69	44	83	59	78	66	90	62
14	66	50	38	18	38	27	27	12	41	28	38	20	74	54	63	47	71	51	90	69	75	54	87	62
15	72	49	51	29	44	30	18	6	50	33	42	29	58	35	66	49	73	60	89	71	77	55	77	57
16	76	57	51	36	46	34	21	2	44	21	43	33	45	31	61	59	76	66	75	59	79	57	65	47
17	67	55	46	35	50	35	32	12	25	19	65	35	47	34	62	41	78	60	78	57	87	57	70	58
18	66	47	42	30	45	32	42	29	33	19	66	48	56	35	59	41	78	61	83	63	78	65	78	63
19	52	40	32	22	40	35	43	25	42	32	60	36	48	38	66	41	79	66	91	63	91	64	80	59
20	47	32	27	17	36	27	36	22	44	37	48	34	58	38	65	41	85	66	79	67	93	71	67	51
21	40	32	35	22	39	23	56	32	38	23	56	38	53	36	64	44	88	65	74	64	92	66	66	43
22	58	36	43	27	41	20	60	39	35	29	52	32	52	37	67	44	90	72	76	56	72	62	73	47
23	58	35	38	33	40	24	45	30	38	24	47	21	45	34	72	57	93	71	85	60	72	62	75	49
24	52	30	37	32	42	27	34	12	32	21	40	17	46	34	75	55	81	72	87	70	72	58	78	49
25	52	35	37	27	38	27	24	12	27	21	51	29	43	37	74	59	88	70	78	69	72	53	81	57
26	52	39	32	22	38	30	44	18	36	12	56	30	53	39	74	53	85	66	87	74	74	51	79	63
27	51	36	37	28	37	32	44	28	39	29	41	27	45	31	82	53	79	62	75	60	74	59	70	58
28	38	31	33	17	32	26	44	30	49	31	42	27	42	30	88	62	94	70	72	58	74	60	67	51
29	40	28	28	11	34	20	44	28	.....	.....	45	27	47	25	83	69	83	68	76	54	73	58	69	45
30	45	34	33	20	30	18	30	11	.....	.....	49	33	56	33	87	65	73	60	77	59	75	59	59	44
31	43	26	.....	.....	36	20	21	12	.....	.....	41	21	.....	.....	86	64	.....	.....	87	67	74	57	.....	.....
Range	51°		47°		42°		61°		43°		51°		57°		55°		50°		43°		42°		48°	
Monthly means	50°		35°. 7		35°. 8		32°. 4		31°. 1		37°. 5		40°. 8		62°. 1		72°. 1		74°. 7		72°		67°. 5	

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Maximum, minimum, and mean temperatures—Continued.

TORONTO, CANADA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	59.8	39.1	47	25.2	16	6.4	39.2	25	12	3.5	43	21	32	12.5	55	30	62.8	51	76.2	44.4	79	60.2	77	55.5
2	54	34.6	46	31	39.8	15.3	38.8	34	28	0.4	46	28.8	44.8	22	46.2	36	65	44.2	73	50.8	67	50	81.8	55
3	54.8	37.5	42.6	24.8	48.2	38	48.2	36	31.4	15.7	48.8	33	31.8	15	54.2	31.8	69	51	79	52.5	69.8	48	68	47.8
4	57.2	45.5	51.4	30	50	26.1	57.5	28.3	24.8	13.2	46.2	15.5	26	9.5	50	38.5	73.5	54	70.8	57	72.8	50.8	64.2	46
5	58.5	49.5	38.2	26.3	27.8	21	30.2	23.5	20	1.2	27	15.7	33	14.2	57	39.8	80	52.4	78.2	56.4	75.2	53	72.8	54
6	47	31.9	37	20.3	32.2	19.5	31.2	20	20	5	33.5	25.8	37.8	24.2	47.6	30	71	58.5	80	57.5	73.5	55	78.5	56.2
7	53.5	28.3	46.2	31.2	32.4	22.2	33	22	20.8	9.2	39.1	29	41	27.3	52.2	25.3	77.5	53.5	83.5	61	80	58.8	75	51
8	61.4	36	46.6	37.6	39.4	24.8	35	28.5	24.2	3.4	38	24.7	36.2	26	60.2	33	70.2	53	82.4	65	82.4	58.2	76.5	58
9	61	43.5	38	26	46.2	36	36.2	24	28	7.1	26	17.4	37.2	27	86	39.5	80	54	75.8	65.5	83.8	57.8	80.2	52.5
10	63	44.2	33.8	20.5	36.4	31	35	29.3	25.5	8.5	28	13.8	44.2	29	80.4	50.5	69	55.5	74.8	63	81	61.4	88.6	60.5
11	61	46.5	39	24.8	40.8	29	32	22	25.8	4.2	27.5	15.2	35.8	20.8	63	43.8	57.8	47.8	75	59.8	80	60.5	85.8	64
12	50	37.2	34	25	37	32.5	27	15.8	38.7	4	20.2	5.5	37	18	64.2	44.8	63	47	66	56.5	95	64.5	73.2	59.2
13	55	36	26	14.2	34	17.8	26	12.5	42	31	22	7	41.2	21	74.5	49.5	69.2	47	76	55	74.5	59	76	58
14	67	41.6	29	10.5	32	9.5	23	12.4	33	20.4	35	18.7	60.8	35.5	60.5	42	70.2	46.8	82.6	56.5	75	56.5	84.8	60
15	62	36	36.5	24.6	31.5	25	12.8	3.8	39	20.5	33.2	19	54	29.8	64.2	42	67	51.5	83	66.5	80	51	79	60
16	69.2	37.8	39	29	39.8	19.8	15.1	1.5	38.5	22.5	38.2	26	39	25.8	69	44.5	63.2	56	69.5	53.5	80	54.2	66.6	54.6
17	52.4	44.5	34	27	39	17.2	26.8	3.0	22	10.2	40.4	33.5	37	30	53.2	39	74.8	54.2	72.2	45.5	84	57	66.2	55
18	59	47.7	32	25	38.8	30	36	16	27.2	8.5	49.2	38	44	29.2	52.4	36.2	75	53.5	81	53.5	78.8	56.4	74.2	59.8
19	52.6	43	29	22	37.2	27.8	36	15.7	38.8	26	57	30	50.2	28.3	63.5	39.5	75.8	53	83.2	58.4	76.2	49	78	63
20	43	33	28	17	33.2	20.3	26.8	6.5	38.2	28.5	38.8	28.3	43.2	35	55.2	45	65.2	52.2	75	55.3	86	65.5	63	48
21	47.5	40	27	16	25.2	13	38.2	24.4	34	26.8	50.8	31	44	31.8	61	44.2	70	51.7	76	47.5	73	60	63.4	41.4
22	54.2	39.4	34	15	29.4	10.2	45.6	34.5	32	27.8	45	23.8	48	29.5	63	40	88	53	76.2	50	71.5	51.8	66	42.8
23	56	43	.....	.....	30.2	14.2	39.5	23.5	39.2	25	22.5	14.7	46.2	28.5	66	39.5	87.5	66.2	79.4	52.5	68.4	54	69.2	46.8
24	50	31.2	.....	.....	35	19.6	30	12.5	30.5	16.2	29	12.7	41	22.8	62.2	48.8	73.2	57	80	53.5	73	52.8	73	49.2
25	48.4	32.5	.....	.....	34	27	15.1	8.5	27	15.3	43.8	25	39	28.3	72	47.5	69.5	53	83.2	63	74.8	51	77	52
26	49	35.2	.....	.....	36.2	32	25	7.8	26.4	3	46	23	51	33	58.8	46.5	62.2	54.8	79	67.2	75	55	73.2	55.8
27	49	37	.....	.....	35	29	36.5	17.2	32	16.7	36.5	18.2	42.2	25	66.2	38	75.8	56.5	71.2	62	77.2	55.4	69	61
28	42.8	32	.....	.....	31	21.8	35	21	37	20.3	36.2	18	40	28.3	77.8	45	86.2	56	67.5	59	76	54	62.8	55
29	35	24.2	.....	.....	35.2	15.7	32	6.6	.....	.....	36.4	16.9	36.8	26	69	53.5	82.2	56.7	78	54.2	77.8	57	67.5	48.8
30	46	27.5	17.2	13.8	25.8	8.8	7.2	— 4	.....	.....	39.8	23.5	52	27	78.2	51	76.4	49.5	79.2	53.5	77.8	55.8	56.2	39.5
31	47.5	27.8	.....	.....	34	18	14.6	— 0.5	.....	.....	29.7	15.5	.....	.....	79	57.5	.....	.....	82	63	81	61.4	.....	.....
Range	45°		.....	.....	41°.8		61°.5		41°.6		51°.5		51°.3		60°.7		43°.8		39°.1		47°		47°.2	
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

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Maximum, minimum, and mean temperatures—Continued.

TYBEE ISLAND, GA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	.....	76	78	73
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75.5	.....	74	81	71
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	.....	75	81	75
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	.....	71	81	71
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	.....	72	81	73
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	.....	75	82	72
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	74	83	75
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	.....	69	86	71
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	71	89	69
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	.....	71	80	70
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	.....	71	78	69
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69	.....	74	81	75
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	84	71	80	72
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75.5	85	75	82	72
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	84	71	89	73
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	82	76	85	70
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76.5	80	73	87	73
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	84	73	87	74
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	88.5	77	88	75
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	88	74	86	74
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*72	.....	71	86	75	78	72
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	.....	74	90	74	78	70
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	71	89	73	78	69
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	.....	71	88	75	78	71
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	.....	75	80	73	80.5	69
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	77	80	70	82	74
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71	.....	74	77	71	81	73
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	.....	71	75	69	.....	65
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	72	77	66	.....	52
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	.....	72	84	71	.....	60
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	80	72	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78°.5		79°.		75°.8	

* Station opened June 21, 1874.

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Maximum, minimum, and mean temperatures—Continued.

VICKSBURG, MISS.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1													57	46	76	52	93	73	95	76	91.5	72	93	73
2													60	41	82	57	93	71	95	68	95	74	93	74
3													70	45	84	69	89	69	89	68	94	80.5	92	73
4													74	46	70	59	92	69	82	68	96	77	91	71
5													77	57	67	55	93	72	75	69	95	72	85	71.5
6													79	66	74	54	92	72	89	68	94.5	72	88	72
7													73	57	81	54	90	73	94	66	94	75	90	73
8													63	59	83	56	90	74	94	70	95	78	87	74
9													63	44	82	59	91	72	81	70	95	78	83	71
10													60	43	82	60	91	74	81	69	97	79	90	72
11													67	43	85	63	91	75	86	71	96.5	80	90	71
12													70	47	86	63	91	73	86	70	96	73	90	68
13													69	54	86	65	90	69	90	72	99	80	90	70
14													80	56	87	65	93	70	87	68	98	76	87	68.5
15													72	59	89	66	94	70	86	67	95.5	77	86	68
16													61	60	82	66	90	70	88	66	96	75.5	84	71
17													63	54	85	60	90	70	82	73	90	69	88	67
18													62	50	88	62	89	67	92	72	86	71	90	71
19													73	61	81	60	90	70	92	73	91	72	84	70
20													73	55	90	61	92	71	93	74	91.5	72	80	66
21													73	50	92	72	92	70	94	73	92	73	80	56
22													78	61	87	68	81	70	92	74	94	70.5	84	57
23											*52	*45	65	53	92	68	92	70	94	76	91	79	89	65
24											56	41	55	47	91	71	91	71	96	75	87	72	85.5	70
25											67	41	68	46	91	70	92	72	94	77	93	75	85.5	70
26											71	57	76	55	90	70	92	75	92	76	94.5	76	84	69
27											78	57	81	57	90	69	92	77	96.5	77	92	77	76	63
28											66	56	68	45	84	72	92	75	93	74	91	74	71	53
29											59	50	65	47	91	72	90	75	87	71	92	70	75	54
30											70	53	71	45	93	73	94	75	90	66	94	78	83	57
31											69	61			95	73			92	70	91	72		
Range													40°		43°		27°		30°.5		29°		40°	
Monthly means	63°		57°		52°.4		52°.2		54°		62°.5		57°.7		75°.4		81°.9		81°.1		84°.6		77°	

* Station supplied with maximum and minimum thermometers March 24, 1874.

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Maximum, minimum, and mean temperatures—Continued.

VIRGINIA CITY, MONT.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	45	22	31	16	39	23	28	11	37	22	44	27	46	33	60	44	89	52	69	50	48	39
2	.....	.....	52	28	20	−15	36	13	29	17	27	16	50	23	46	31	64	46	88	60	75	43	57	34
3	.....	.....	53	32	− 3	−18	13	1	21	6	30	13	50	27	54	33	64	47	90	55	84	47	72	47
4	.....	.....	49	32	12	−10	26	8	25	12	23	8	39	27	65	35	62	45	81	62	83	50	74	44
5	.....	.....	52	28	12	− 2	29	16	32	13	21	5	36	27	72	40	60	47	80	50	80	55	79	46
6	.....	.....	45	29	29	8	33	12	44	29	24	5	38	22	72	46	56	42	83	51	79	49	80	43
7	.....	.....	54	39	31	15	32	17	25	14	26	18	43	24	68	46	52	34	84	52	79	52	81	52
8	.....	.....	58	36	18	− 1	38	22	28	5	28	15	48	30	62	43	48	33	80	54	74	47	81	50
9	.....	.....	59	32	6	− 4	41	36	36	12	26	2	55	28	44	30	48	34	81	51	83	48	45	36
10	.....	.....	54	34	17	6	33	21	39	20	28	5	56	30	48	36	57	38	83	53	62	49	51	33
11	.....	.....	44	32	14	− 2	30	11	30	16	40	11	59	36	51	36	62	38	81	61	56	44	50	34
12	*60	40	49	23	14	− 2	26	13	26	6	44	21	43	31	44	37	50	43	84	53	79	45	61	33
13	39	29	56	28	19	1	3	− 3	29	12	30	24	33	28	50	38	55	42	86	53	84	49	59	35
14	26	21	43	28	29	11	37	7	28	6	30	10	38	25	57	38	67	44	77	46	85	49	64	36
15	30	21	45	20	29	17	41	21	32	20	23	18	35	20	66	37	74	46	85	50	80	50	53	43
16	29	24	54	25	29	11	43	30	37	10	26	12	36	28	70	43	72	54	86	54	71	50	53	38
17	41	27	54	25	29	16	36	26	33	14	25	11	43	22	74	46	69	43	87	57	81	49	44	35
18	46	21	36	18	25	7	28	12	24	15	22	11	51	37	75	53	65	37	83	53	76	53	50	30
19	57	29	42	21	20	11	29	17	26	− 3	30	11	43	27	77	50	80	48	75	55	72	50	48	38
20	55	32	41	22	27	12	27	8	26	1	29	19	28	20	70	50	72	53	83	54	72	49	52	38
21	24	19	40	30	30	12	13	− 6	16	− 4	32	8	33	15	65	48	82	50	87	57	67	43	58	33
22	29	14	33	23	28	18	8	− 5	6	− 2	39	21	44	16	71	57	81	52	87	60	75	43	68	37
23	25	10	42	23	29	7	15	− 3	− 1	−12	40	25	52	35	65	50	71	53	85	58	83	48	72	41
24	12	4	49	28	35	8	24	1	9	−18	44	21	61	43	75	44	70	48	83	53	82	59	72	44
25	21	− 3	49	38	35	15	33	13	11	− 2	42	27	56	40	79	50	61	48	64	53	75	56	60	44
26	32	18	45	18	23	7	36	24	25	− 3	35	13	45	33	57	41	67	48	80	46	77	50	66	34
27	42	31	23	4	30	7	31	19	31	4	41	27	60	29	47	39	60	45	82	50	69	50	76	43
28	48	27	29	5	37	23	37	17	39	13	35	23	68	37	43	33	69	43	79	53	70	49	78	46
29	48	29	31	6	32	15	38	29	.....	.....	32	19	71	40	55	39	64	44	83	54	80	47	78	48
30	43	28	43	29	39	23	31	17	.....	.....	29	19	60	42	60	36	47	43	85	50	81	52	77	49
31	43	25	.....	.....	39	28	24	9	.....	.....	41	15	.....	.....	61	47	.....	.....	83	54	71	49		
Range	.....		55°		57°		49°		62°		42°		56°		49°		49°		44°		45°.		51°.	
Monthly means	35°. 8		35°. 6		16°. 7		23°. 1		18°. 4		24°. 1		38°. 4		51°. 1		53°. 9		67°. 7		61°. 8		50°. 2	

* No observations taken from August 3 to October 12, 1873.

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Maximum, minimum, and mean temperatures—Continued.

WASHINGTON, D. C.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	67	46	51	32.5	35	31	47.5	35	32.5	24	55.5	27.5	35	29	72	48	79	64	90	66	88	71.5	83.5	61
2	71	50.5	60	29	41	32	58	43.5	27	17	60	29	51	32	59	46	74	53	89	73	83.5	68	86	58
3	74	49	60	41	63	36	63.5	39.5	35	24.5	64	36	57	37	63.5	40	64.5	56.5	88	68	81	60.5	90	62.5
4	69.5	50	59	31	73	50	66.5	58.5	36.5	28	69	41	44	29	48	40.5	82	59	93.5	64.5	80	60.5	77	66
5	75	59	63	43	50	30	62	35	35	22	57.5	32	50	24	56	42	92	65	78	68	81	57	85	65
6	64	46	47	38	38	32	56.5	33.5	30	20	45	36	65	42	63	41	88	69	82.5	61	84	62.5	87	66
7	55	42	50	38	38	32	68	53.5	28.5	20	47.5	35	63	47	62	42	94.5	71	88	68	74	68.5	87	66
8	71	43	58	43.5	44	32.5	60	38	33	21	49	33.5	61.5	44	76	44	95	77	94	69	81.5	70	87	67
9	68	50	56	42	61	42	52	32.5	36	15	39	27	59	40	85.5	57.5	102.5	74	98.5	75.5	87	66	80	64
10	69	42	42	36.5	46	35	53	38.5	39	24.5	48	30.5	47	38	92.5	61	92	74	95	75	87	67	82	58
11	71	42	50	32	58	33	45.5	32	49	24	43	32	67	34	84.5	49	83	69	87	74.5	91	63	90	58
12	62	50	50	36	71	53.5	35.5	27	45	28	41	27	45	24.5	70	43	89	69	82	74.5	92	66	94	68
13	61	40	39.5	27	65	41	33.5	25	58	35	30	21	59	26	78	52	73	58	89.5	72	90	70.5	79	68
14	73	43	35	24	46	33	34.5	25	60	38	40	24	61	43	86	60.5	82.5	52	94.5	72	82	65	77	69
15	73	45	51	25	54.5	36.5	27.5	11.5	51	32	54	26	72	58	72	58	82	57	98	74	83	64	81	67
16	73	48	63	33.5	54	33	22.5	11	58	40	43	36	62	44	75	54	81	64	88	74.5	85	59	72	66.5
17	76	49	45	33	56	28.5	30.5	11	42	29	62	38	47	40	78	56.5	83	68	83	64	85.5	59	69	65
18	72	62	40	34	56.5	34	36.5	9	35.5	20.5	67	52	50.5	39	66	52	87.5	64.5	90	62	92.5	59	81.5	62.5
19	74	51	40.5	32	54.5	38.5	43.5	31	44	23.5	75	51	49	44	71	45	83	62	91	67	93	71	80.5	60.5
20	53	44	33	25	43	35	43.5	35	60.5	39	63	43	64	43	67	55	79	63	94	71	100.5	70	77	59.5
21	54	41.5	44	21.5	36	27	51	34.5	71.5	48	60	38	61	46	65	52	85	64.5	82	67.5	99.5	71	68	51.5
22	62	38.5	46	27	39.5	20	63	46	77	60	57	44	63	43	70	47	95	69	81.5	63	85	66	71.5	51
23	66	40.5	47	27	33.5	27	71	40	78	49	55	29	52	45	73	45	98	72	86	62	71	61.5	74.5	50
24	69	50	54	39.5	43.5	25	47.5	27	49	32	37.5	20.5	63.5	40	71	62	92	77	86	70	66	59	76	57
25	60	43.5	49	37	39.5	27	29	18	33	24	58	25	56.5	40	86.5	61	94	65	89	71	70.5	62	78.5	60
26	60	37.5	40.5	30	36	30	37	15	42	22	63.5	47	52	38	76	60	91	74	84	73	74.5	55	80.5	57
27	66	50	57	34	44	32	46.5	36.5	42	28	64.5	43	61	38	73	50	82	71	75.5	71	72.5	54	80.5	59
28	59	36	40.5	32	40.5	33	57.5	37	48	25	57.5	41	55	38	89	58	95	75	81.5	71	74	50	74	61.5
29	47	33	38.5	27	49	30	53	33.5	.....	.....	52	40	45	30	91.5	58	101	77.5	75.5	67	78	50	61.5	57
30	52	26	39	22.5	38	21.5	43	30	.....	.....	65.5	34	59	34.5	86	62	84	69	82	61	80	51	62	52
31	59	31	.....	.....	44	18	39.5	21	.....	.....	48	32	.....	.....	89	63.5	.....	.....	88.5	61	77.5	63	.....	.....
Range	50°		41°.5		55°		62°		63°		54°.5		48°		52°.5		49°		37°.5		50°.5		44°	
Monthly means	55°.3		41°.1		40°.9		40°.5		36°.4		44°.6		47°.8		64°.3		77°.2		78°.4		73°.2		70°.4	

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Maximum, minimum, and mean temperatures—Continued.

WILMINGTON, N. C.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	62	33	55.5	42	53	47	69	50	79	56	95	70	92	76	91	69	81	62
2	.....	.....	.....	.....	.....	.....	67	46	44.5	39	60.5	44	62	43	78	64.5	78	67	88	76	92	72	85	62
3	.....	.....	.....	.....	.....	.....	72	42	50	39	71.5	47	67	46	69.5	55	87	63.5	86	69	91	72	86	65
4	.....	.....	.....	.....	.....	.....	71	54	52	39	71	54	73	50	73	54	90	74	89	70	84	68	89	65
5	.....	.....	.....	.....	.....	.....	69.5	53	47	31.5	59	45	68.5	42	63.5	49	82	73	91	72	83	63	85	67
6	.....	.....	.....	.....	.....	.....	66	62	62.5	39	67.5	45	79	61	71.5	48	86	72.5	85	70	86	67	87	66
7	.....	.....	.....	.....	.....	.....	65.5	44	48	40.5	74.5	63	82	63	73	49	89	70	85	64	87	70	90	66
8	.....	.....	.....	.....	.....	.....	48.5	38.5	43.5	33	61	46.7	77	65.5	78	54	92.5	76	90	71	83	73	90	71
9	.....	.....	.....	.....	.....	.....	56.5	37	43	32.5	60	40	73	69	81	60	97.5	76.5	89	75	90	69	85	67
10	.....	.....	.....	.....	.....	.....	59	45	49	32.5	68	45	71	50	82	64	96	77	88	77	92	67	74	63
11	.....	.....	.....	.....	.....	.....	67	47	60	37.5	56.5	43	66	.....	81	58	90	78	88	75	94	73	89	67
12	.....	.....	.....	.....	.....	.....	52	44	64	40.5	57.5	34	58	41	74.5	58	89	72	85	73	92	74	84	68
13	.....	.....	.....	.....	.....	.....	48	37.5	66	55	47	34	61	34	79	61	85	67	82	70	92	72	85	71
14	.....	.....	.....	.....	.....	.....	51	37.5	66	46	53.5	31	73	52	73	60	81.5	63	91	73	90	67	78	73
15	.....	.....	.....	.....	.....	.....	38	30	48.5	41.5	57	38	76	62	78	66	85	66	91	70	86	67	81	71
16	.....	.....	.....	.....	.....	.....	32.5	19	65.5	46	63	44.5	77.5	65.5	85	64	84	67	91	73	90	67	87	73
17	.....	.....	.....	.....	.....	.....	41.5	22	53	44	67	57	70	60	83	66	86.5	75	92	72	84	63	85	71
18	.....	.....	.....	.....	*66.5	48.5	61	34	44	35	67	53	62	52	83.5	65	93.5	73.5	87	70	91	68	85	70
19	.....	.....	.....	.....	68	50.5	66.5	41.5	55	37	76.5	60	69	50	76	57	94	70	81	71	90	71	86	70
20	.....	.....	.....	.....	52.5	37	63	45.5	64	45	75	55	76	66	81	58	92	70	89	69	92	73	85	70
21	.....	.....	.....	.....	52	32	61	44	72	54.5	62	53	79	55	81	65	85	70	90	73	93	75	78	60
22	.....	.....	.....	.....	43	34.5	71	53	73	59.5	76.5	58.5	73	61.5	78	57.5	88	71	88	74	92	71	77	56
23	.....	.....	.....	.....	46	38	73	60	74	62	66.5	55	82	62	81.5	57	90.5	70.5	84	69	92	71	77	59
24	.....	.....	.....	.....	51	35	60.5	46	63.5	38	55	42	70	57	84	69	97	73	88	65	90	72	80	61
25	.....	.....	.....	.....	41.5	40.5	43.5	31	49	38.5	61.5	42	75	55	87.5	72	96	73	88	68	79	67	81	64
26	.....	.....	.....	.....	44.5	39.5	45.5	26	50.5	35.5	68	57	67	52	91	70	95	74	89	69	79	59	82	62
27	.....	.....	.....	.....	49.5	40.5	60	34.5	61.5	39	73.5	52	71	48	84	64	94	71	83	70	79	58	81	62
28	.....	.....	.....	.....	47	30.5	63	48	57	42	80.5	56.5	74	58.5	84	63	91.5	74	80	70	79	56	81	62
29	.....	.....	.....	.....	52	32	56	36	.....	.....	72	54.5	61	43	91.5	66	89	73	84	69	73	62	71	59
30	.....	.....	.....	.....	46.5	29	62	37.5	.....	.....	77.5	57	66	41	90	70.5	89	75	84	69	73	62	72	55
31	.....	.....	.....	.....	44.5	18.5	66.5	42	.....	.....	80.5	63	.....	.....	85	67	.....	.....	89	68	79	65	.....	.....
Range	.....	.....	.....	.....	.....	.....	54°		42°.5		49°.5		48°		43°.5		34°.5		28°		38°		35°	
Monthly means	.....	.....	.....	.....	.....	.....	50°.1		48°.1		57°.3		62°.8		70°.1		80°.1		79°.1		76°.7		74°.1	

*Station supplied with maximum and minimum thermometers December 18, 1873.

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Maximum, minimum, and mean temperatures—Continued.

WOOD'S HOLE, MASS.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	49	43	24	14	48	39	21	11	41	30	31	22	50	43	61	50	75	60	75	65	76	62
2	.....	.....	53	44	42	18	46	43	25	13	47	35	43	28	51	38	49	48	70	60	78	61	75	62
3	.....	.....	59	33	50	40	47	38	37	28	55	37	46	33	60	38	62	50	75	59	70	58	73	62
4	.....	.....	52	47	58	42	56	46	36	22	47	40	43	19	59	43	60	53	69	60	72	55	68	52
5	.....	.....	57	36	46	34	49	35	23	14	42	28	38	17	52	41	60	55	71	57	76	59	66	52
6	.....	.....	57	37	40	39	45	32	20	11	37	22	50	38	56	40	65	58	66	55	75	60	70	61
7	.....	.....	57	35	39	24	53	48	27	14	36	30	43	33	50	37	74	59	64	53	75	64	77	62
8	.....	.....	56	46	40	24	54	39	31	12	43	33	39	33	54	42	72	58	68	61	67	66	73	61
9	.....	.....	52	39	47	38	45	34	35	12	39	23	39	36	59	42	76	59	80	63	71	63	71	57
10	.....	.....	36	31	43	28	45	41	32	23	30	20	40	34	65	46	74	56	70	65	78	63	74	60
11	.....	.....	39	29	46	27	46	36	31	20	24	16	45	30	52	40	64	54	71	65	80	65	83	64
12	.....	.....	56	39	50	42	37	28	35	21	26	13	54	23	58	40	66	54	73	66	76	64	66	53
13	.....	.....	41	30	47	32	31	20	46	33	25	11	41	21	59	44	68	55	72	66	76	67	67	52
14	.....	.....	34	24	39	28	35	21	47	29	41	20	47	35	59	47	70	53	79	64	71	60	69	55
15	.....	.....	36	29	42	30	24	16	43	28	37	21	50	44	57	46	73	59	75	65	66	58	74	60
16	.....	.....	47	35	48	38	20	10	39	30	43	30	50	38	57	47	68	58	75	65	77	59	71	65
17	.....	.....	47	35	43	33	25	11	35	18	43	33	40	32	60	47	65	60	79	63	71	56	71	62
18	.....	.....	48	34	46	32	38	23	34	14	54	43	43	32	68	50	70	59	76	66	78	62	61	60
19	.....	.....	38	25	42	32	46	38	41	19	45	39	47	35	62	47	67	52	78	64	76	64	65	58
20	.....	.....	34	26	43	31	36	23	44	37	44	32	42	40	65	46	59	50	73	65	74	66	71	60
21	.....	.....	45	27	29	18	42	27	44	37	46	29	49	38	63	46	64	50	74	64	80	65	68	53
22	.....	.....	45	32	34	22	46	39	47	38	45	35	50	38	60	45	71	57	78	61	65	56	65	50
23	.....	.....	45	29	38	26	48	38	47	34	36	18	45	37	67	49	77	62	76	63	69	53	69	52
24	.....	.....	56	31	39	30	39	28	39	27	27	12	48	36	60	48	73	62	74	65	70	55	72	59
25	.....	.....	40	26	37	31	23	12	31	24	40	25	40	35	57	54	71	59	74	62	69	52	70	61
26	*54	49	30	20	41	33	18	5	32	18	47	40	44	35	62	53	70	57	74	66	69	54	75	58
27	63	53	46	18	38	28	41	19	36	29	48	34	49	35	65	49	70	59	75	65	70	52	74	54
28	52	45	35	23	35	29	45	39	35	18	41	32	49	35	67	53	66	60	77	65	73	53	67	57
29	46	39	35	25	40	32	36	25	.....	.....	39	27	50	35	69	51	72	61	78	67	73	55	67	60
30	45	38	35	20	34	18	35	14	.....	.....	44	29	46	33	67	53	80	64	79	64	72	56	66	52
31	63	48	.....	.....	39	21	34	15	.....	.....	42	28	.....	.....	66	55	.....	.....	77	66	77	61	.....	.....
Range	.....		41°		44°		51°		36°		44°		33°		39°		32°		27°		28°		33°	
Monthly means	54°		38°		36°		34°. 7		30°		34°. 9		38°. 2		51°. 3		61°. 8		67°. 8		66°. 2		03°. 8	

* Station supplied with maximum and minimum thermometers October 26, 1873.

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Maximum, minimum, and mean temperatures—Continued.

WYTHEVILLE, VA.

Day of month.	1873.						1874.																	
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	58	84	63	77	60	79	54
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	49	83	64	77	61	80	47
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	59	85	58	78	54	79	48
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	60	91	55	74	56	82	48
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	62	84	62	79	48	80	48
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	60	85	53	81	56	81	51
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	62	89	55	75	61	82	57
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	66	91	59	79	60	83	53
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	95	65	86	59	79	55	82	58
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	65	80	61	79	55	77	47
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	63	80	64	85	61	85	45
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	55	76	64	92	63	83	47
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	51	83	58	89	64	82	50
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	44	87	57	83	58	71	57
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	51	85	61	81	57	70	63
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	59	80	62	80	52	81	60
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	59	81	61	81	48	69	64
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	82	51	81	58	86	48	79	64
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	58	86	54	89	50	77	65
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	49	87	56	90	50	66	50
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	51	80	61	86	59	70	41
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	54	83	66	86	58	70	47
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	58	75	62	78	66	72	44
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	65	84	61	73	63	72	47
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	64	74	65	74	59	72	48
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	62	72	64	74	59	73	50
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	65	77	64	63	56	64	57
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	62	93	59	75	66	64	54	57	52
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	53	84	65	70	55	61	56	59	50
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	86	55	87	63	79	49	60	55	63	47
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	56	.....	.....	82	51	77	54	.....	.....
Range	.....	.....	.....	.....	.....	.....	35°. 8		.....		.....		.....		.....		51°		42°		44°		42°	
Monthly means	.....	.....	.....	.....	.....	.....	.....		37°. 9		42°. 3		48°. 1		60°. 1		70°		69°. 9		66°. 5		61°. 9	

*Station supplied with maximum and minimum thermometers May 28, 1874.

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Maximum, minimum, and mean temperatures—Continued.

YANKTON, DAKOTA.

Day of month.	1873.						1874.															
	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	73	31	54	28	32	24	52	23	29	9	59	27	60	25	85	58	68	56	87	57	84	52	89	64
2	76	38	46	31	28	7	52	38	29	8	51	34	50	23	59	48	73	60	95	70	78	57	66	54
3	65	45	66	27	5	3	43	− 1	25	12	35	15	47	24	48	38	76	58	90	73	87	61	62	48
4	76	45	53	27	11	− 4	20	−10	25	9	42	13	31	16	65	35	78	59	97	74	90	64	64	52
5	57	31	48	21	10	− 9	38	12	22	14	45	28	53	23	75	40	78	61	96	75	85	69	87	45
6	63	25	63	31	21	10	43	25	27	2	34	22	50	29	78	44	78	63	95	72	85	66	94	51
7	79	31	64	39	32	20	43	27	35	5	27	13	61	23	80	50	83	60	97	73	87	66	95	69
8	75	50	66	34	35	10	49	25	30	8	34	7	51	27	90	64	77	63	97	80	90	66	86	66
9	81	51	66	37	19	4	38	26	43	− 2	42	17	64	21	76	61	67	54	95	70	93	67	78	68
10	74	48	60	30	29	9	32	13	33	15	36	14	77	31	75	48	64	48	87	65	94	67	78	65
11	69	52	51	28	31	10	22	12	47	8	37	12	63	35	67	45	65	44	86	58	92	67	84	62
12	77	50	39	22	17	− 1	35	12	41	10	33	8	70	35	67	41	76	48	90	73	87	60	70	53
13	73	46	47	18	31	9	12	− 8	23	3	31	11	59	44	53	48	74	59	91	65	90	60	74	41
14	86	39	66	24	45	6	0	−12	24	8	39	31	56	34	65	48	65	58	89	74	82	69	64	41
15	74	58	62	32	41	24	12	−12	43	8	45	34	56	22	70	48	68	57	81	59	90	65	69	30
16	58	48	54	41	32	18	36	8	44	20	51	42	60	27	78	45	84	57	87	58	101	72	71	46
17	51	40	52	31	43	12	40	28	43	19	43	37	61	34	70	45	85	64	88	63	78	57	70	49
18	46	35	31	17	27	15	36	2	34	28	37	31	56	36	79	52	86	70	96	71	92	58	56	50
19	62	33	35	11	20	0	19	− 8	35	11	44	28	55	25	79	55	88	71	88	66	95	78	62	43
20	66	32	49	20	15	10	30	8	43	10	51	30	56	33	76	49	83	64	67	57	93	68	57	37
21	58	36	50	23	37	10	30	3	19	− 4	47	31	48	34	68	53	89	70	74	60	86	66	71	51
22	38	24	41	27	38	25	12	− 3	11	4	41	28	54	32	82	53	91	74	87	67	75	62	77	50
23	51	21	42	26	37	22	11	− 8	12	− 3	35	18	60	24	91	60	90	71	88	73	88	53	82	45
24	36	24	52	28	32	14	28	−20	11	− 3	53	22	68	40	82	63	87	69	93	67	87	58	79	54
25	38	29	35	20	42	13	24	− 8	12	− 3	46	26	63	36	84	55	94	73	93	66	86	57	74	54
26	34	21	49	19	37	11	48	4	37	− 2	30	12	53	35	89	64	91	72	76	60	77	64	72	54
27	33	20	26	13	22	3	36	12	47	14	42	19	54	40	92	71	91	71	75	55	86	66	71	44
28	32	11	32	10	35	15	48	7	58	20	27	20	70	34	87	70	76	60	90	54	85	65	87	37
29	42	18	32	19	22	4	33	10	.....	.....	42	8	80	45	88	67	84	57	90	61	82	59	76	41
30	42	21	45	21	33	14	10	−10	.....	.....	45	28	89	52	78	62	86	62	92	70	83	50	80	37
31	37	14	.....	.....	45	25	20	− 4	.....	.....	46	21	.....	.....	78	61	.....	.....	80	63	83	58	.....	.....
Range	75°		56°		54°		72°		62°		52°		73°		57°		50°		43°		51°		65°	
Monthly means	46°. 1		35°. 9		18°. 1		15°. 6		18°. 8		30°. 6		44°. 4		62°. 1		70°. 7		78°. 2		74°. 2		61°. 7	

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PAPER 10.—*Monthly and annual amounts of rain-fall, in inches, from October, 1873, to September, 1874, inclusive.*

Stations.	1873.			1874.									
	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	Annual amounts.
Albany, N. Y	.....	.....	.....	3.61	2.90	1.97	4.97	2.32	4.71	6.78	1.94	4.01	.....
Alpena, Mich	4.71	2.74	0.89	2.34	0.85	1.83	0.75	4.16	2.05	2.06	1.77	3.86	28.01
Atlantic City, N. J	.....	.....	.....	3.22	2.72	1.77	5.92	1.86	3.01	1.56	1.23	5.37	.....
Augusta, Ga	2.58	4.70	2.66	3.44	7.22	7.78	6.23	3.88	3.29	5.35	6.81	5.85	59.79
Baltimore, Md	6.21	4.05	0.97	2.22	3.18	1.41	6.65	1.92	1.11	4.30	3.47	4.83	40.32
Barnegat, N. J	.....	.....	.....	5.33	2.96	3.01	12.84	3.69	2.97	3.30	2.57	9.29	.....
Bismarck, Dak	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.64	.....
Boston, Mass	5.33	8.34	5.64	4.32	3.41	1.60	7.99	3.71	3.94	3.47	6.67	2.05	56.47
Breckinridge, Minn	1.25	1.01	0.48	1.74	0.57	2.21	0.55	2.08	8.21	1.23	7.27	1.43	28.06
Buffalo, N. Y	6.34	3.89	4.56	5.61	2.42	1.08	2.44	3.64	1.50	4.64	0.46	3.39	39.37
Burlington, Vt	5.87	1.59	1.01	3.44	0.82	1.31	3.19	4.21	3.85	7.15	1.07	4.21	37.75
Cape Hatteras, N. C	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.43	.....
Cape Henry, Va	.....	.....	.....	3.92	7.34	5.15	7.24	4.47	2.83	4.79	3.69	3.24	.....
Cairo, Ill	5.28	3.04	4.25	3.11	7.38	6.68	8.12	1.55	2.20	0.52	2.79	3.14	48.06
Cape May, N. J	4.92	3.08	2.44	3.55	3.90	2.08	6.66	2.93	4.16	4.42	2.08	6.71	46.93
Charleston, S. C	2.07	5.08	4.94	3.51	10.45	3.45	2.95	5.50	2.29	13.74	7.06	6.66	67.70
Cheyenne, Wyo	0.70	0.17	0.08	0.11	0.11	0.74	0.61	1.50	1.34	1.87	0.44	0.93	8.60
Chicago, Ill	2.43	1.61	4.44	3.47	1.51	2.15	2.67	2.07	3.25	0.58	3.15	3.76	31.09
Cincinnati, Ohio	2.79	2.50	6.47	3.95	5.91	3.65	4.06	1.38	2.58	3.42	1.03	2.33	40.07
Cleveland, Ohio	3.38	1.65	5.50	5.16	3.18	1.47	1.87	1.83	3.98	4.06	1.82	4.66	38.56
Colorado Springs, Colo	.....	.....	.....	0.06	0.54	0.50	3.55	5.90	0.20	0.81	0.91	3.37	.....
Corinne, Utah	1.62	0.39	1.88	1.04	0.99	.....	.....	.....	.....	.....	.....	.....	.....
Corsicana, Tex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.34	.....
Davenport, Iowa	1.48	0.63	3.84	4.34	0.74	1.34	2.64	3.45	5.37	3.10	3.68	7.86	38.47
Denver, Colo	0.73	0.16	0.53	0.84	0.53	0.49	1.70	2.43	1.21	3.35	0.68	1.34	13.99
Detroit, Mich	2.60	1.03	4.69	5.16	2.00	1.55	1.39	1.93	4.53	3.65	2.11	0.67	31.31
Dodge City, Kans	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.94	.....
Dubuque, Iowa	2.07	0.77	2.07	2.45	0.36	1.28	1.54	1.08	3.30	3.34	2.13	7.68	28.07
Duluth, Minn	2.31	1.59	0.66	0.58	0.61	1.82	0.49	1.81	10.89	2.62	5.62	5.59	34.59
Eastport, Me	7.38	5.32	1.36	2.70	2.36	3.02	3.09	4.71	6.82	3.27	5.13	3.67	48.83
Erie, Pa	5.87	3.58	4.89	5.54	4.01	1.09	1.52	1.94	3.76	7.03	1.99	4.43	45.65
Escanaba, Mich	3.37	0.62	1.30	0.50	0.54	0.54	0.47	3.95	5.63	3.58	3.74	3.94	28.18
Fort Benton, Mont	0.19	0.86	0.12	0.67	0.10	0.64	0.43	2.98	2.13	0.10	1.17	0.49	9.88
Fort Gibson, Ind. Ter	2.80	1.97	3.66	3.69	3.44	2.91	5.83	3.54	3.38	1.99	1.54	4.41	39.16
Fort Sully, Dak	0.56	0.15	0.08	0.09	0.17	0.92	0.21	5.05	6.24	0.67	0.57	0.18	14.89
Galveston, Tex	2.26	8.91	2.53	1.37	3.11	3.09	3.38	5.80	1.68	9.31	7.19	5.84	54.49
Grand Haven, Mich	2.50	.....	.....	.....	.....	.....	.....	2.23	5.70	4.19	1.19	5.05	.....
Indianapolis, Ind	5.27	2.46	5.90	3.75	4.17	5.79	4.12	4.03	2.25	3.53	2.90	2.09	46.26
Indianola, Tex	2.42	3.35	3.53	1.18	2.92	4.30	0.74	0.18	6.80	5.76	1.25	12.89	45.32
Jacksonville, Fla	5.65	2.88	3.38	0.82	7.33	2.13	1.60	5.38	5.92	7.48	6.89	7.07	56.53

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Monthly and annual amount of rain-fall, in inches &c.—Continued.

Stations.	1873.			1874.									
	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	Annual amounts.
Keokuk, Iowa	4.69	1.43	8.56	3.66	0.89	1.14	2.40	1.65	4.01	4.54	3.87	7.92	44.76
Key West, Fla	1.13	2.39	3.42	2.90	1.73	0.11	1.55	2.78	4.54	3.03	3.77	7.42	34.68
Knoxville, Tenn	3.75	4.86	4.83	5.14	2.73	3.96	17.32	2.35	5.11	3.13	7.89	2.43	63.50
La Crosse, Wis	1.92	1.81	1.13	1.59	0.67	1.51	2.12	3.07	6.51	2.31	3.41	4.99	31.04
Lake City, Fla	0.29	4.79	2.31	0.72	7.49	1.37	4.26	2.27	7.80	3.96	0.89	4.00	40.15
Leavenworth, Kans	1.56	0.89	5.24	3.14	1.35	3.05	2.80	1.60	4.96	3.23	1.72	5.50	35.04
Lexington, Ky	5.47	2.09	4.41	5.41	4.89	5.90	6.81	0.79	3.55	6.26	1.57	2.89	50.04
Louisville, Ky	3.26	2.19	6.99	2.39	5.18	6.63	6.01	1.17	2.95	2.71	3.23	0.62	43.33
Long Branch, N. J	.....	.....	.....	5.15	1.83	2.45	11.37	3.49	2.42	3.41	2.22	10.99	.....
Lynchburgh, Va	2.65	2.83	1.87	4.13	3.66	1.94	8.33	1.35	6.80	3.89	3.61	3.68	44.74
Marquette, Mich	2.94	1.54	0.99	0.98	0.36	0.44	0.23	2.54	3.22	2.43	2.26	3.39	21.32
Memphis, Tenn	5.95	3.87	3.18	2.88	4.10	6.61	10.16	0.63	2.22	0.47	4.60	4.72	49.39
Milwaukee, Wis	1.96	1.72	2.81	3.46	0.66	2.64	2.02	3.00	3.40	3.86	1.79	4.63	31.95
Mobile, Ala	1.85	3.23	2.97	2.48	2.72	10.57	10.92	1.23	5.69	10.21	3.79	2.54	58.20
Montgomery, Ala	.....	4.58	2.61	3.69	6.57	10.66	9.45	2.03	4.31	3.87	1.25	0.39	.....
Morgantown, W. Va	5.76	3.53	3.00	3.17	2.17	3.45	7.20	1.25	4.55	5.75	2.16	5.05	47.04
Mount Washington, N. H	9.23	5.50	5.95	4.40	2.47	6.71	5.74	6.53	13.44	7.97	9.51	5.52	82.97
Nashville, Tenn	4.26	4.36	5.94	5.22	9.23	5.26	11.84	1.49	2.87	2.65	3.52	3.12	59.76
New Haven, Conn	7.18	4.75	4.44	4.29	3.86	1.34	7.89	4.92	3.41	4.90	12.99	4.07	64.04
New London, Conn	5.62	5.52	2.65	2.65	2.85	2.96	10.85	5.25	3.63	4.84	16.44	2.08	65.35
New Orleans, La	1.89	5.95	1.79	1.68	3.68	7.57	13.62	0.22	9.62	12.93	4.82	4.21	67.98
New York, N. Y	2.47	4.01	2.24	4.69	2.41	1.85	7.02	2.16	2.87	3.22	2.53	7.16	42.63
Norfolk, Va	3.64	4.13	5.30	2.09	4.79	4.26	5.97	3.97	3.49	8.81	5.04	3.78	55.27
North Platte, Nebr	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.85	.....
Omaha, Nebr	1.82	0.19	0.93	0.32	0.92	1.49	2.01	1.24	6.93	0.54	2.08	7.18	25.65
Oswego, N. Y	6.57	1.78	3.34	5.60	1.87	1.64	2.26	2.08	4.98	7.62	0.29	3.19	41.22
Pembina, Dak	0.40	0.42	0.18	0.06	0.06	0.44	0.15	1.51	3.45	1.40	3.02	1.70	12.79
Philadelphia, Pa	5.20	5.10	1.38	4.58	2.46	2.16	9.76	2.75	2.02	2.25	5.65	6.01	49.32
Pike's Peak, Colo	.....	0.30	0.55	1.32	1.16	1.21	5.20	2.98	0.58	6.00	3.72	2.31	.....
Peck's Beach, N. J	.....	.....	.....	3.84	4.41	2.59	7.25	2.45	1.81	3.10	1.73	9.08	.....
Pittsburgh, Pa	6.21	1.72	3.71	2.90	3.15	2.94	7.20	2.37	1.84	7.68	1.98	2.56	44.26
Port Huron, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.23	1.89	.....
Portland, Me	6.15	3.36	1.80	3.13	2.13	1.14	4.03	3.86	3.14	5.47	5.29	2.73	42.23
Portland, Oreg	3.86	4.33	5.15	9.46	4.28	5.15	3.68	2.38	2.68	0.19	0.83	1.70	43.69
Punta Rassa, Fla	3.90	2.83	1.57	2.05	2.59	0.08	0.41	1.27	11.94	8.06	5.11	4.73	44.45
Rochester, N. Y	8.67	3.24	4.59	5.72	3.35	2.90	4.99	2.98	2.79	4.37	0.84	2.73	47.17
Salt Lake City, Utah	.....	.....	.....	.....	.....	.....	0.90	2.84	0.74	2.42	1.03	0.20	.....
Sandy Hook, N. J	.....	.....	.....	5.03	1.31	2.48	12.55	3.52	2.97	1.99	1.91	11.30	.....
San Diego, Cal	.00	0.77	5.46	3.11	3.73	1.20	0.35	0.32	.00	0.12	.00	.04	15.10
San Francisco, Cal	0.83	1.16	9.73	5.66	2.21	3.36	0.90	0.66	0.14	.00	.00	0.02	24.67
Santa Fé, N. Mex	0.07	0.38	0.83	1.39	1.60	1.51	1.71	0.70	0.54	3.92	4.73	1.42	15.80
Savannah, Ga	1.09	5.74	3.68	2.07	9.71	2.85	2.69	4.85	4.85	10.14	6.58	8.89	63.14

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Shreveport, La	4.15	8.35	4.93	3.51	7.58	9.67	10.64	1.19	1.35	5.59	0.19	6.33		63.04
Saint Louis, Mo	3.27	1.64	5.10	3.04	3.66	4.36	3.43	3.70	2.00	5.71	4.70	2.32		42.93
Saint Paul, Minn	2.57	0.79	0.38	0.49	1.07	2.24	0.95	1.65	11.67	1.95	3.90	5.76		33.42
Saint Paul's Island, Alaska	3.69	3.60	5.59	2.23	5.23	2.97	.84	.58	2.91					
Saint Regis, N. Y				4.57	1.69	2.40	10.34	4.14	2.49	2.33	4.36	11.69		
Toledo, Ohio	3.30	2.08	5.32	3.53	2.78	1.39	3.14	1.61	4.06	2.09	2.43	.80		32.53
Tybee Island, Ga										4.555	3.68			
Vicksburg, Miss	2.20		2.65	5.27	3.47	9.86	22.24	0.16	3.43	7.39	0.06	6.20		65.24
Virginia City, Mont		0.69	0.06	0.11	0.06	0.14	0.10	4.18	3.58	1.10	3.11	1.46		
Washington, D. C	5.62	3.02	0.97	1.89	1.84	2.06	5.65	2.89	3.47	2.34	1.71	7.84		39.23
Wilmington, N. C	2.79	3.18	4.69	5.14	6.54	3.72	2.88	5.07	2.81	5.81	4.01	9.35		56.02
Woods Hole, Mass	5.54	9.05	6.23	3.92	2.73	1.10	9.32	3.45	4.47	2.26	3.80	2.03		53.90
Wytheville, Va	1.92	2.62	2.83	2.65	2.89	2.98	5.85	1.16	3.54	6.16	2.38	5.38		40.66
Yankton, Dak	1.49	0.03	0.52	0.57	0.65	0.79	0.24	2.39	6.65	3.84	4.05	1.74		23.16

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PAPER 11.—*Statement showing the number of times the wind was observed blowing from the eight cardinal points of the compass during each month and season of the year ending September 30, 1874, compiled from the local observations taken at the several stations of observation at 7 a. m., 2 p. m., and 9 p. m., (local time.)*

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Albany, N. Y.*	N.	....	....	....	12	6	2	8	3	11	6	16	6	13	33	....	18
	N. W.	....	....	....	21	24	40	32	26	22	10	12	14	98	44	....	45
	W.	....	....	....	4	4	9	8	16	8	6	3	5	33	17	....	8
	S. W.	....	....	....	1	0	5	2	1	0	3	1	2	8	4	....	1
	S.	....	....	....	36	8	19	13	21	27	40	17	28	53	84	....	44
	S. E.	....	....	....	1	4	4	9	5	0	2	3	8	18	5	....	5
	E.	....	....	....	1	0	0	0	0	0	1	1	1	0	2	....	1
	N. E.	....	....	....	3	2	0	5	2	5	4	9	1	7	18	....	5
	Calm.	....	....	....	14	36	14	13	19	17	21	31	28	46	69	....	59
	Blank.	....	....	....	0	0	0	0	0	0	0	0	0	0	0	....	0
Alpena, Mich	N.	10	7	6	2	5	3	9	7	6	6	9	3	19	21	20	13
	N. W.	11	15	8	17	11	29	23	26	15	18	23	20	78	56	46	36
	W.	17	32	25	27	20	19	15	9	15	12	7	14	43	34	63	72
	S. W.	18	11	20	10	11	14	7	2	6	11	5	8	23	22	37	41
	S.	12	3	12	18	6	4	4	6	8	7	3	4	14	18	19	36
	S. E.	10	3	11	9	10	10	13	15	22	22	24	31	38	68	44	30
	E.	5	3	2	2	9	7	10	11	8	8	8	3	28	24	11	13
	N. E.	2	6	2	3	7	2	3	9	2	5	6	1	14	13	9	12
	Calm.	8	10	7	5	5	5	6	8	8	4	8	6	19	20	24	17
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atlantic City, N. J.†	N.	....	....	....	4	9	4	5	0	1	3	10	2	9	14	....	....
	N. W.	....	....	....	11	19	16	15	13	16	8	11	9	44	35	....	....
	W.	....	....	....	23	18	22	11	12	9	3	6	6	45	18	....	....
	S. W.	....	....	....	13	5	10	9	19	23	18	6	14	38	47	....	....
	S.	....	....	....	23	11	18	12	26	18	40	22	10	56	80	....	....
	S. E.	....	....	....	4	4	9	10	4	9	8	4	13	23	21	....	....
	E.	....	....	....	7	6	9	7	7	7	6	13	25	23	26	....	....
	N. E.	....	....	....	7	12	3	21	11	6	6	19	10	35	31	....	....
	Calm.	....	....	....	1	0	2	0	1	1	1	2	1	3	4	....	....
	Blank.	....	....	....	0	0	0	0	0	0	0	0	0	0	0	....	....
Augusta, Ga	N.	3	6	13	6	7	7	3	10	2	2	12	7	20	16	16	26
	N. W.	6	6	7	12	15	17	6	10	3	4	11	9	33	18	21	34
	W.	15	20	11	6	8	16	18	12	5	6	3	9	46	14	44	25
	S. W.	1	11	8	11	3	11	15	9	18	4	15	5	35	37	17	22
	S.	9	4	8	9	9	13	16	13	23	13	9	3	42	45	16	26
	S. E.	2	2	2	5	3	0	8	4	6	24	5	1	12	35	5	10
	E.	5	0	4	3	7	7	2	8	11	5	4	13	17	20	18	14
	N. E.	9	2	14	14	13	9	12	8	6	18	22	21	29	46	32	41
	Calm.	43	39	26	27	19	13	10	19	16	17	12	22	42	45	104	72
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baltimore, Md	N.	12	4	10	6	4	7	7	9	11	10	24	14	23	45	30	20
	N. W.	14	19	19	24	26	30	19	15	12	7	13	10	64	32	43	69
	W.	4	22	10	9	6	10	3	14	14	10	3	7	27	27	33	25
	S. W.	15	9	14	19	9	11	14	11	8	23	10	8	36	41	32	42
	S.	5	6	4	7	4	1	2	8	15	22	15	11	11	52	22	15
	S. E.	13	5	9	10	8	12	14	20	18	9	4	14	46	31	32	27
	E.	2	3	1	3	3	4	6	6	5	6	11	8	16	22	13	7
	N. E.	9	9	14	9	18	10	22	5	6	3	9	15	37	18	33	41
	Calm.	19	13	12	6	6	8	3	5	1	3	4	3	16	8	35	24
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barnegat, N. J.†	N.	....	....	....	7	4	8	5	2	6	8	5	3	15	19	....	....
	N. W.	....	....	....	18	23	33	19	5	13	1	12	8	57	26	....	....
	W.	....	....	....	10	10	4	7	20	13	9	9	9	31	31	....	....
	S. W.	....	....	....	22	9	17	12	12	13	14	4	12	41	31	....	....
	S.	....	....	....	15	4	5	4	15	9	28	10	4	24	47	....	....
	S. E.	....	....	....	6	4	6	7	12	22	20	16	16	25	58	....	....
	E.	....	....	....	2	9	7	15	10	5	7	6	18	32	18	....	....
	N. E.	....	....	....	9	18	8	13	9	8	5	28	19	30	41	....	....
	Calm.	....	....	....	4	3	5	8	8	1	1	3	1	21	5	....	....
	Blank	....	....	....	0	0	0	0	0	0	0	0	0	0	0	....	....
Bismarck, Dak.‡	N.	....	....	....	....	0	0	1	5	....	....	3	11	6	....	....	....
	N. W.	....	....	....	....	26	30	26	22	....	....	15	5	78	....	....	....
	W.	....	....	....	....	11	17	8	4	....	....	25	12	29	....	....	....
	S. W.	....	....	....	....	12	13	16	11	....	....	14	8	40	....	....	....
	S.	....	....	....	....	5	3	6	4	....	....	7	5	13	....	....	....
	S. E.	....	....	....	....	11	13	14	23	....	....	9	10	50	....	....	....
	E.	....	....	....	....	2	3	4	5	....	....	10	20	12	....	....	....
	N. E.	....	....	....	....	17	14	14	18	....	....	10	13	46	....	....	....
	Calm.	....	....	....	....	0	0	1	1	....	....	0	6	2	....	....	....
	Blank.	....	....	....	....	0	0	0	0	....	....	0	0	0	....	....	....

* Observations began December 23, 1873.

† Observations began December 10, 1873.

‡ Observations began February 1, 1874. (June and July, 1874, incomplete.)

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Boston, Mass.	N.	14	18	10	4	7	2	4	3	4	4	8	10	9	16	42	21
	N. W.	12	34	32	21	32	48	23	31	35	17	28	23	102	80	69	85
	W.	12	16	21	26	22	14	16	14	6	12	7	4	44	25	32	69
	S. W.	10	9	10	10	3	9	6	14	3	23	7	10	29	33	29	23
	S.	8	2	2	13	5	4	6	1	3	9	6	12	11	18	22	20
	S. E.	5	1	1	4	3	3	4	12	16	9	16	4	19	41	10	8
	E.	16	6	4	6	5	8	16	14	12	10	13	17	38	35	39	15
	N. E.	10	2	5	6	6	1	13	4	9	9	6	8	18	24	20	17
	Calm.	6	2	8	3	1	4	2	0	2	0	2	2	6	4	10	12
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Breckinridge, Minn.	N.	15	19	9	17	10	18	15	22	11	22	11	7	55	44	41	36
	N. W.	21	18	20	22	13	32	19	13	8	9	6	16	64	23	55	55
	W.	13	6	15	5	9	6	3	0	5	1	3	8	9	9	27	29
	S. W.	4	5	3	3	3	5	3	3	5	4	7	5	11	16	14	9
	S.	7	11	2	5	6	4	6	8	19	26	18	30	18	63	48	13
	S. E.	18	14	33	32	32	24	22	27	24	14	19	19	79	57	51	97
	E.	2	9	4	0	2	2	4	9	6	1	2	0	15	9	11	6
	N. E.	13	4	0	1	1	1	7	9	9	4	7	3	17	20	20	2
	Calm.	0	4	7	8	8	1	5	2	3	12	20	2	8	35	6	23
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buffalo, N. Y.	N.	10	6	3	5	4	4	12	6	5	5	11	4	22	21	20	12
	N. W.	6	14	6	7	5	12	9	5	4	11	6	4	26	21	24	18
	W.	15	29	31	25	20	25	15	14	20	17	13	16	54	50	60	78
	S. W.	21	12	18	24	16	26	23	30	33	29	22	22	79	84	55	56
	S.	13	4	12	11	10	5	4	6	5	12	5	11	15	22	28	33
	S. E.	13	6	4	2	3	4	3	2	2	1	1	8	9	4	27	9
	E.	6	13	12	11	16	10	6	10	11	1	16	8	26	28	27	39
	N. E.	9	4	3	6	7	2	14	10	6	9	8	6	26	23	19	16
	Calm.	0	2	4	2	3	5	4	10	4	8	11	11	19	23	13	9
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burlington, Vt	N.	30	36	27	26	28	18	27	34	34	25	32	28	79	91	94	81
	N. W.	17	8	3	8	4	21	14	8	7	2	5	3	43	14	22	15
	W.	1	5	6	4	3	6	5	5	3	2	6	7	16	11	13	13
	S. W.	9	1	3	3	2	5	5	9	12	5	2	10	19	19	20	8
	S.	24	25	35	41	24	32	31	29	30	42	30	32	92	102	79	100
	S. E.	0	3	1	2	0	2	2	3	1	3	2	4	7	6	7	3
	E.	6	5	2	3	3	1	0	0	1	1	5	4	1	7	15	8
	N. E.	3	5	5	5	5	3	5	0	0	6	7	2	8	13	10	15
	Calm.	3	2	11	1	15	5	1	5	2	7	4	2	11	13	7	27
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cape Hatteras, N. C.*	N.	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....
	N. W.	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....
	W.	....	....	....	....	....	....	....	....	....	....	....	7	....	....	....	....
	S. W.	....	....	....	....	....	....	....	....	....	....	....	5	....	....	....	....
	S.	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....
	S. E.	....	....	....	....	....	....	....	....	....	....	....	12	....	....	....	....
	E.	....	....	....	....	....	....	....	....	....	....	....	7	....	....	....	....
	N. E.	....	....	....	....	....	....	....	....	....	....	....	49	....	....	....	....
	Calm.	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....
	Blank.	....	....	....	....	....	....	....	....	....	....	....	0	....	....	....	....
Cape Henry, Va.†	N.	....	....	....	11	15	8	10	7	4	2	11	11	25	17	....	....
	N. W.	....	....	....	17	15	18	15	11	8	6	7	6	44	21	....	....
	W.	....	....	....	4	7	9	4	6	8	3	5	4	19	16	....	....
	S. W.	....	....	....	18	13	12	8	11	21	20	10	8	31	51	....	....
	S.	....	....	....	15	4	5	11	11	18	17	11	6	27	46	....	....
	S. E.	....	....	....	14	11	15	11	24	15	19	12	16	50	46	....	....
	E.	....	....	....	5	1	9	12	6	7	5	12	25	27	24	....	....
	N. E.	....	....	....	6	16	9	13	10	9	21	25	10	32	55	....	....
	Calm.	....	....	....	3	2	8	6	7	0	0	0	4	21	0	....	....
	Blank.	....	....	....	0	0	0	0	0	0	0	0	0	0	0	....	....
Cairo, Ill	N.	14	8	6	7	13	9	18	9	5	2	13	17	36	20	39	26
	N. W.	12	20	21	15	17	15	14	8	5	5	2	5	37	12	37	53
	W.	4	7	8	5	1	1	1	2	4	6	4	4	4	14	15	14
	S. W.	12	13	17	10	2	7	11	21	25	29	9	3	39	63	28	29
	S.	20	12	14	22	16	12	17	10	14	9	17	14	39	40	46	52
	S. E.	11	4	4	10	2	9	7	9	5	6	8	8	25	19	23	16
	E.	1	5	3	3	10	9	3	14	8	7	12	12	26	27	18	16
	N. E.	10	16	16	18	18	26	19	15	17	22	20	12	60	59	38	52
	Calm.	9	5	4	3	5	5	0	5	7	7	8	15	10	22	29	14
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Observations began September 1, 1874. †Observations began December 15, 1873.

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Cape May, N J.....	N.	11	15	13	8	11	5	12	5	7	3	12	5	22	22	31	32
	N. W.	19	31	26	24	25	32	13	19	19	4	10	12	64	33	62	75
	W.	8	9	7	9	5	9	7	5	5	3	5	6	21	13	23	21
	S. W.	11	11	15	9	0	8	5	10	12	9	10	8	23	31	30	24
	S.	16	6	12	25	19	16	12	25	26	51	16	15	53	93	37	56
	S. E.	13	5	4	6	1	10	10	6	9	9	14	9	26	32	27	11
	E.	6	4	5	4	6	8	15	13	8	4	11	20	36	23	30	15
	N. E.	8	6	6	8	16	5	13	5	3	5	13	9	23	21	23	30
	Calm.	1	3	5	0	1	0	3	5	1	5	2	6	8	8	10	6
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Charleston S. C.....	N.	25	11	26	23	14	10	4	6	2	3	5	6	20	10	42	60
	N. W.	7	11	8	6	9	5	7	6	4	2	1	4	12	7	22	25
	W.	11	19	9	10	4	19	9	11	11	7	6	5	39	24	35	38
	S. W.	5	14	10	10	10	27	34	22	40	27	21	7	83	77	26	34
	S.	4	3	4	8	11	5	9	7	11	19	5	3	21	35	10	15
	S. E.	3	4	2	7	2	5	5	8	7	6	16	16	18	29	23	13
	E.	16	7	3	12	7	8	14	20	14	14	12	22	42	40	45	12
	N. E.	16	5	5	13	20	12	5	10	1	12	23	21	27	36	42	33
	Calm.	6	16	16	4	7	2	3	3	0	3	4	6	8	7	27	36
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheyenne, Wyo.....	N.	13	7	8	3	6	10	9	9	11	10	9	14	28	30	34	17
	N. W.	12	17	14	5	9	10	17	11	15	10	11	13	38	36	42	28
	W.	30	40	33	51	36	27	29	18	16	17	30	26	74	63	86	120
	S. W.	11	6	12	15	15	6	6	4	6	2	13	11	16	21	28	42
	S.	8	8	9	10	7	20	8	13	17	25	18	16	41	60	32	26
	S. E.	4	0	2	4	3	5	6	12	7	6	4	6	23	17	10	9
	E.	0	2	2	2	3	1	6	9	10	5	5	1	16	20	3	7
	N. E.	1	0	0	1	0	7	1	7	1	6	0	2	15	7	3	1
	Calm.	14	10	13	2	5	7	8	10	7	12	3	1	25	22	25	20
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chicago, Ill	N.	9	2	5	11	7	12	18	16	4	12	16	7	46	32	18	23
	N. W.	14	20	12	18	7	14	3	2	5	4	4	8	19	13	42	37
	W.	6	14	19	9	9	15	7	3	10	7	3	12	25	20	32	37
	S. W.	31	25	21	16	19	22	14	17	21	20	9	20	53	50	76	56
	S.	15	5	21	20	15	4	4	14	12	16	8	18	22	36	38	56
	S. E.	4	12	9	8	5	6	9	11	12	5	14	12	26	31	17	22
	E.	4	0	4	3	9	10	12	6	14	10	14	8	28	32	12	16
	N. E.	9	11	2	7	12	9	20	23	11	18	25	5	52	54	25	21
	Calm.	1	1	0	1	1	1	3	1	1	1	0	0	5	2	2	2
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cincinnati, Ohio.....	N.	5	5	10	11	6	14	16	17	7	10	10	16	47	27	26	27
	N. W.	18	10	10	16	18	22	15	15	16	8	6	3	52	30	31	44
	W.	9	20	10	13	12	11	4	11	10	14	3	6	26	27	35	35
	S. W.	13	15	12	10	6	5	10	6	12	10	12	13	21	34	41	25
	S.	14	12	19	24	13	13	9	13	13	18	12	21	35	43	47	56
	S. E.	22	10	16	9	6	8	2	7	3	5	13	7	17	21	29	31
	E.	6	6	4	2	9	12	15	8	10	11	18	8	35	39	20	15
	N. E.	3	10	11	8	14	6	15	9	10	11	14	12	30	35	25	33
	Calm.	3	2	1	0	0	2	4	7	9	6	5	4	13	20	9	1
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cleveland, Ohio	N.	15	8	5	8	6	2	16	15	17	14	19	13	33	60	36	9
	N. W.	7	20	11	15	12	22	7	17	12	12	5	9	46	29	38	28
	W.	7	9	9	9	10	23	8	10	11	5	8	6	41	24	22	28
	S. W.	23	22	24	14	13	13	10	10	10	8	15	6	33	33	57	51
	S.	17	7	17	24	5	10	7	10	10	15	4	14	27	29	38	46
	S. E.	12	13	16	13	16	17	13	16	17	17	19	29	46	53	54	45
	E.	10	0	4	0	5	2	10	3	5	3	5	3	15	13	13	9
	N. E.	2	5	7	9	17	3	19	11	8	9	16	10	33	33	17	33
	Calm.	0	0	0	1	0	1	0	1	0	0	2	0	2	2	0	1
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colorado Springs, Col.*	N.	....	....	24	10	23	22	25	15	6	0	0	31	62	6	....	61
	N. W.	....	....	17	20	8	4	9	6	9	34	35	13	19	78	....	45
	W.	....	....	4	6	7	5	4	5	6	7	5	3	14	18	....	17
	S. W.	....	....	4	6	2	2	2	5	4	7	18	2	9	29	....	12
	S.	....	....	3	3	4	13	5	14	34	19	31	4	32	24	....	10
	S. E.	....	....	9	18	12	20	12	9	13	12	0	33	41	25	....	39
	E.	....	....	1	0	2	4	0	4	1	5	0	0	8	6	....	3
	N. E.	....	....	3	2	1	4	7	5	4	5	0	1	16	9	....	6
	Calm.	....	....	24	26	21	19	26	30	13	4	4	3	75	21	....	71
	Blank.	....	....	0	2	4	0	0	0	0	0	0	0	0	0	....	6

* Observations began November 12, 1873.

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Corinne, Utah*	N.	23	27	30	25	39	...	...	...	...	...	...	...	...	...	...	94
	N. W.	14	11	12	9	18	...	...	...	...	...	...	...	...	...	...	39
	W.	1	4	0	4	2	...	...	...	...	...	...	...	...	...	...	6
	S. W.	9	9	4	7	1	...	...	...	...	...	...	...	...	...	...	12
	S.	20	12	9	21	12	...	...	...	...	...	...	...	...	...	...	42
	S. E.	4	2	6	7	0	...	...	...	...	...	...	...	...	...	...	13
	E.	3	2	2	4	0	...	...	...	...	...	...	...	...	...	...	6
	N. E.	5	7	7	3	5	...	...	...	...	...	...	...	...	...	...	15
	Calm.	14	16	23	13	7	...	...	...	...	...	...	...	...	...	...	43
	Blank.	0	0	0	0	0	...	...	...	...	...	...	...	...	...	...	0
Davenport, Iowa	N.	14	6	6	3	7	9	18	14	3	7	9	7	41	19	27	16
	N. W.	15	22	23	15	11	29	8	11	8	12	5	9	48	25	46	49
	W.	12	15	18	18	15	10	8	5	18	11	3	12	23	32	39	51
	S. W.	18	12	17	13	11	14	15	22	19	24	18	22	51	61	52	41
	S.	7	6	9	9	5	4	5	14	10	12	6	9	23	28	22	24
	S. E.	7	10	3	5	8	8	5	9	9	8	7	11	22	24	25	16
	E.	6	10	9	9	10	11	14	13	17	8	33	8	38	58	24	28
	N. E.	5	3	3	12	12	6	14	4	1	7	10	9	24	18	17	27
	Calm.	9	6	5	9	5	2	3	1	5	4	2	3	6	11	18	19
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denver, Col	N.	19	7	7	8	6	19	8	11	6	16	12	13	38	34	39	21
	N. W.	8	5	4	15	7	5	16	16	7	7	8	2	37	22	15	26
	W.	4	7	3	4	1	5	4	5	3	4	5	3	14	12	14	8
	S. W.	0	1	7	2	3	9	5	8	6	7	4	4	22	17	5	12
	S.	25	37	28	21	27	10	16	18	19	29	37	30	44	85	92	76
	S. E.	7	12	8	9	9	13	14	19	20	12	8	12	46	40	31	26
	E.	4	2	4	5	7	6	5	4	9	4	9	10	15	22	16	16
	N. E.	10	8	9	10	8	13	11	12	18	14	9	15	36	41	33	27
	Calm.	16	11	23	19	16	13	11	0	2	0	1	1	24	3	28	58
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Detroit, Mich	N.	10	11	8	8	5	10	12	5	6	9	14	6	27	29	27	21
	N. W.	17	22	15	13	16	27	9	18	11	4	2	12	54	17	51	44
	W.	29	23	29	20	16	23	10	12	12	9	4	11	45	25	63	65
	S. W.	13	8	17	25	12	16	11	17	23	28	6	20	44	57	41	54
	S.	7	5	7	5	3	2	7	10	8	15	10	19	19	33	31	15
	S. E.	6	6	2	6	4	3	9	3	8	4	10	6	15	22	18	12
	E.	6	7	11	6	19	12	12	13	20	8	27	6	37	55	19	36
	N. E.	4	5	4	10	8	0	17	13	2	15	19	7	30	36	16	22
	Calm.	1	3	0	0	1	0	3	2	0	1	1	3	5	2	7	1
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dubuque, Iowa	N.	6	8	14	12	4	7	11	4	1	4	10	3	22	15	17	30
	N. W.	25	27	14	14	12	19	15	13	6	7	9	12	47	22	64	40
	W.	5	1	9	3	5	20	7	2	7	7	3	5	29	17	11	17
	S. W.	3	3	7	11	8	8	9	3	11	8	4	7	20	23	13	26
	S.	11	10	10	11	5	7	5	11	12	14	9	18	23	35	39	26
	S. E.	8	9	6	3	5	7	5	13	6	6	9	9	25	21	26	14
	E.	2	1	1	2	6	3	4	5	5	5	9	6	12	19	9	9
	N. E.	3	2	3	7	5	4	13	7	5	4	12	0	24	21	5	15
	Calm.	30	29	29	30	34	18	21	35	37	38	28	30	74	103	89	93
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Duluth, Minn	N.	4	6	2	4	2	5	10	7	2	2	9	3	22	13	13	8
	N. W.	19	28	19	13	13	27	11	9	9	19	5	22	47	33	69	45
	W.	8	8	6	5	5	14	4	2	2	8	1	5	20	11	21	16
	S. W.	27	26	44	33	28	18	20	9	6	14	9	19	47	29	72	105
	S.	6	1	1	4	2	0	1	1	1	1	1	4	2	3	11	7
	S. E.	3	3	0	2	0	0	0	0	2	2	2	6	0	6	12	2
	E.	3	2	1	3	1	1	4	1	2	2	1	1	6	5	6	5
	N. E.	18	6	6	8	19	22	33	46	39	32	51	13	101	142	37	33
	Calm.	5	10	14	21	14	6	7	18	7	13	14	17	31	34	32	49
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eastport, Me	N.	11	22	23	18	27	28	25	12	12	6	14	18	65	32	51	67
	N. W.	6	27	12	12	14	13	4	9	3	2	1	5	26	6	38	38
	W.	4	6	7	6	7	6	12	1	4	3	4	0	19	11	19	20
	S. W.	9	8	25	22	7	10	5	9	4	5	9	12	24	18	29	54
	S.	28	8	0	6	3	20	25	40	27	43	26	21	85	96	57	9
	S. E.	6	5	0	5	2	2	1	2	0	1	0	0	5	1	11	7
	E.	3	4	8	6	10	5	2	4	8	10	5	12	11	23	19	24
	N. E.	19	8	13	9	9	0	10	3	21	5	14	8	13	40	35	31
	Calm.	7	2	5	9	5	9	6	13	11	18	20	14	28	49	23	19
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Station removed to Salt Lake City, Utah, March 9, 1874.

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Erie, Pa	N.	4	4	3	3	5	4	3	1	6	2	6	8	8	14	16	11
	N. W.	8	16	15	21	13	27	16	18	16	17	6	10	61	39	34	49
	W.	14	8	12	6	9	18	11	13	12	12	7	7	42	31	29	27
	S. W.	8	18	20	22	12	16	9	17	11	18	10	3	42	39	29	54
	S.	29	19	23	25	17	14	7	10	12	8	10	32	31	30	80	64
	S. E.	17	7	7	1	4	1	5	4	6	3	20	15	10	29	39	12
	E.	2	0	1	7	8	1	7	3	2	3	12	2	11	17	4	16
	N. E.	8	11	1	7	10	5	29	22	22	26	22	11	56	70	30	12
	Calm.	3	7	12	1	6	7	3	5	3	4	6	2	15	7	12	19
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Escanaba, Mich ...	N.	14	21	14	12	12	15	18	13	13	28	33	8	46	74	43	38
	N. W.	13	18	23	31	13	25	7	6	12	7	1	10	38	20	41	67
	W.	18	25	18	6	4	5	6	3	4	2	5	9	14	11	52	28
	S. W.	9	4	18	15	10	9	8	6	16	10	5	18	23	31	31	43
	S.	24	5	8	13	12	7	17	18	17	36	27	20	42	80	49	33
	S. E.	3	0	6	6	9	12	9	13	16	3	12	16	34	31	19	21
	E.	4	5	0	2	3	5	5	5	4	2	2	2	15	8	11	5
	N. E.	8	7	6	6	14	14	20	28	7	5	5	3	62	17	18	26
	Calm.	0	5	0	2	7	1	0	1	1	0	3	4	2	4	9	5
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Benton, Mont ..	N.	15	5	5	19	11	17	16	14	9	9	10	8	47	28	28	35
	N. W.	2	6	6	6	2	8	2	6	3	2	1	8	16	6	16	14
	W.	15	17	20	12	14	11	14	13	17	29	17	4	38	63	36	46
	S. W.	18	15	17	20	23	12	18	15	21	11	20	32	45	52	65	60
	S.	4	7	9	2	9	2	6	4	17	9	5	6	12	31	17	20
	S. E.	6	3	0	1	0	2	2	4	0	2	3	1	8	5	10	1
	E.	5	3	3	9	3	9	5	22	9	12	21	5	36	42	13	15
	N. E.	3	6	4	8	4	5	9	5	6	7	6	2	19	19	11	16
	Calm.	25	28	29	16	18	27	18	10	8	12	10	24	55	30	77	63
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Gibson, Ind. T.	N.	1	0	2	5	6	14	27	11	5	7	6	11	52	18	12	13
	N. W.	13	15	11	13	15	14	9	1	2	2	1	7	24	5	35	39
	W.	9	15	18	11	10	6	4	6	3	3	2	2	16	8	26	39
	S. W.	2	6	1	5	2	3	5	5	6	6	13	4	13	25	12	8
	S.	2	5	1	3	1	6	11	20	27	23	20	11	37	70	18	5
	S. E.	18	10	11	16	7	12	13	24	28	28	17	24	49	73	52	34
	E.	21	20	28	24	18	21	9	14	11	12	25	19	44	48	60	70
	N. E.	2	2	1	7	7	12	9	1	3	5	3	2	22	11	6	15
	Calm.	25	17	20	9	18	5	3	11	5	7	6	10	19	18	52	47
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Sully, Dak	N.	7	7	0	3	5	11	16	18	14	19	11	6	45	44	20	8
	N. W.	27	22	35	31	13	17	18	10	16	13	10	20	45	39	69	79
	W.	14	15	3	5	3	14	6	7	10	3	7	5	27	20	34	11
	S. W.	1	3	0	5	0	4	3	1	5	4	1	12	8	10	16	5
	S.	4	1	3	0	4	3	4	8	10	10	5	12	15	25	17	7
	S. E.	6	16	13	18	14	14	13	24	22	28	36	20	51	86	42	45
	E.	11	3	4	12	5	13	14	10	4	11	12	4	37	27	18	21
	N. E.	7	6	1	1	9	4	5	7	5	3	11	3	16	19	16	11
	Calm.	16	17	34	18	31	13	11	8	4	2	0	8	32	6	41	83
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Haven, Mich.	N.	9	11	7	9	3	8	9	9	2	6	5	5	26	13	25	19
	N. W.	12	15	13	12	14	26	13	14	8	9	13	7	53	30	34	39
	W.	19	12	13	14	7	10	11	11	21	12	4	11	32	37	42	34
	S. W.	15	14	23	8	15	17	18	24	14	18	16	19	59	48	48	46
	S.	6	2	9	16	6	2	3	9	11	21	1	14	14	33	22	31
	S. E.	9	13	9	6	8	13	6	2	8	3	13	6	21	24	28	53
	E.	5	8	7	5	11	3	12	6	9	2	6	7	21	17	20	23
	N. E.	6	9	3	12	6	9	12	5	2	12	17	5	26	31	20	21
	Calm.	12	6	9	11	14	5	6	13	15	10	18	16	24	43	34	34
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galveston, Tex	N.	25	19	16	14	19	4	15	7	7	2	5	11	36	14	55	49
	N. W.	4	12	7	7	7	2	10	7	1	5	6	4	19	12	20	21
	W.	1	3	1	1	1	1	1	6	0	4	2	2	8	6	6	3
	S. W.	3	5	2	5	2	3	6	11	10	18	9	1	20	37	9	9
	S.	15	13	10	17	15	26	31	26	50	30	32	11	84	112	39	42
	S. E.	19	22	30	27	19	27	15	30	16	17	28	25	72	61	66	76
	E.	17	4	7	4	8	16	4	2	2	8	7	15	22	17	36	19
	N. E.	7	7	18	15	7	10	6	2	3	9	4	18	18	16	32	40
	Calm.	2	5	2	3	6	4	2	2	1	0	0	3	8	1	10	11
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Indianapolis, Ind....	N.	6	5	9	4	5	3	11	8	4	11	10	4	22	25	15	18
	N. W.	16	23	9	16	15	32	22	19	10	4	7	13	73	21	52	40
	W.	13	12	13	13	9	10	4	4	6	9	6	9	18	21	34	35
	S. W.	10	13	14	11	6	11	10	9	20	17	13	9	30	50	32	31
	S.	27	9	19	17	4	11	5	15	7	17	11	17	31	35	53	40
	S. E.	3	5	6	14	14	6	3	10	11	8	16	5	19	35	13	34
	E.	2	7	2	5	7	7	8	5	4	2	8	3	20	14	12	14
	N. E.	3	4	6	6	12	6	18	5	3	11	16	8	29	30	15	24
	Calm.	13	12	15	7	12	7	9	18	25	14	6	22	34	45	47	34
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indianola, Tex.....	N.	18	28	15	13	17	9	19	11	1	6	0	9	39	7	55	45
	N. W.	2	6	3	6	3	2	4	1	1	2	3	0	7	6	8	12
	W.	1	3	1	3	1	0	2	1	0	1	5	0	3	6	4	5
	S. W.	5	8	3	10	4	3	5	3	0	6	4	0	11	10	13	17
	S.	13	15	16	21	17	26	30	31	50	49	42	22	87	141	50	54
	S. E.	16	14	18	15	11	23	15	39	26	18	24	21	77	68	51	44
	E.	24	4	12	8	11	12	3	2	2	5	10	19	17	17	47	31
	N. E.	9	4	21	16	18	16	11	3	3	4	3	16	30	10	29	55
	Calm.	0	8	4	1	2	2	1	2	7	2	2	3	5	11	11	7
	Blank.	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Jacksonville, Fla....	N.	16	12	23	18	12	6	4	6	1	2	10	5	16	13	33	53
	N. W.	20	18	14	16	7	12	10	7	2	4	0	3	29	6	41	37
	W.	6	7	7	4	4	10	8	9	3	1	5	6	27	9	19	15
	S. W.	4	22	11	9	3	20	16	16	19	10	10	6	52	39	32	23
	S.	4	6	5	12	14	9	19	8	18	19	8	3	36	45	32	31
	S. E.	4	4	9	6	7	14	18	10	17	9	3	10	42	29	18	22
	E.	6	2	0	3	9	2	4	10	8	16	16	19	16	40	27	12
	N. E.	32	14	18	21	22	13	8	23	11	18	30	31	44	59	77	61
	Calm.	1	5	6	4	6	7	3	4	11	14	11	7	14	36	13	16
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Keokuk, Iowa.....	N.	1	12	4	6	15	21	15	10	10	8	14	6	46	32	9	25
	N. W.	20	27	20	14	15	13	13	8	5	2	2	11	34	9	58	49
	W.	11	12	18	13	8	10	8	5	11	11	3	5	23	25	28	39
	S. W.	14	13	11	13	9	11	9	12	15	15	12	13	32	42	40	33
	S.	16	7	12	15	10	7	6	20	17	16	6	22	33	39	45	37
	S. E.	9	6	9	8	10	9	6	11	11	8	17	14	26	36	29	27
	E.	4	14	8	6	7	14	13	11	9	8	17	6	38	34	24	21
	N. E.	3	5	6	8	7	5	15	9	3	17	12	5	29	32	13	21
	Calm.	15	4	5	10	3	3	5	7	9	8	10	8	15	27	27	18
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Key West, Fla.....	N.	18	21	19	6	8	10	8	15	0	8	8	6	33	16	45	33
	N. W.	8	7	6	9	4	5	7	8	0	9	11	1	20	20	16	19
	W.	6	5	2	3	1	3	3	3	0	3	10	5	9	13	16	6
	S. W.	0	4	1	0	5	3	0	7	3	7	6	3	10	16	7	6
	S.	0	5	2	1	1	4	3	3	5	9	6	1	10	20	6	4
	S. E.	1	2	2	1	16	14	22	12	22	13	10	11	48	45	14	19
	E.	15	17	23	17	32	35	37	28	55	30	25	51	100	110	83	72
	N. E.	44	28	37	51	12	12	7	14	5	12	11	12	33	28	84	100
	Calm.	1	1	1	5	5	7	3	3	0	2	6	0	13	8	2	11
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Knoxville, Tenn	N.	13	11	12	11	14	25	11	18	8	12	15	6	54	35	30	37
	N. W.	5	4	12	10	5	6	9	7	1	5	2	8	22	8	17	27
	W.	14	23	7	6	6	13	8	8	11	11	1	3	29	23	40	19
	S. W.	20	21	17	18	19	21	16	20	22	21	20	9	57	63	50	54
	S.	9	5	13	13	12	8	14	9	12	6	4	7	31	22	21	38
	S. E.	5	1	3	3	0	2	2	5	4	5	4	3	9	13	9	6
	E.	4	5	7	10	18	4	8	16	11	15	10	13	18	36	22	22
	N. E.	14	13	13	18	5	12	17	15	14	8	21	22	44	43	49	49
	Calm.	9	7	9	4	0	2	5	5	7	10	16	19	12	33	35	18
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Crosse, Wis.....	N.	14	21	20	13	17	8	12	18	4	10	19	8	38	33	43	50
	N. W.	14	13	18	14	12	27	19	8	7	13	4	14	54	24	41	44
	W.	8	5	9	3	7	17	9	6	7	5	3	5	32	15	18	19
	S. W.	12	11	7	12	12	7	10	8	17	17	9	5	25	43	28	31
	S.	20	17	22	25	18	18	11	33	35	31	25	40	62	91	77	65
	S. E.	10	14	9	9	4	4	8	5	6	8	14	3	17	28	27	22
	E.	0	1	1	4	2	3	3	4	3	2	5	2	10	10	3	7
	N. E.	2	8	7	12	10	7	12	11	9	3	6	3	30	18	13	29
	Calm.	13	0	0	1	2	2	6	0	2	4	8	10	8	14	23	3
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Lake City, Fla	N.	11	11	13	10	11	13	7	12	1	1	6	10	32	8	32	34
	N. W.	6	13	7	8	12	10	9	7	1	4	3	7	26	8	26	27
	W.	5	13	4	5	4	9	9	9	7	1	4	4	27	12	22	13
	S. W.	5	12	13	9	15	28	23	24	25	15	19	5	75	59	22	37
	S.	4	1	6	7	7	10	14	4	15	14	4	3	28	33	8	20
	S. E.	6	7	5	9	10	2	12	3	16	18	7	6	17	41	19	24
	E.	17	9	17	20	12	6	10	13	11	18	20	18	29	49	44	49
	N. E.	33	13	23	22	8	11	4	17	11	19	26	32	32	56	78	53
	Calm.	6	11	5	3	5	4	2	4	3	3	4	5	10	10	22	13
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leavenworth, Kans.	N.	16	28	23	20	19	25	27	18	6	13	17	9	70	36	53	62
	N. W.	15	12	11	13	14	3	8	6	11	1	6	9	17	18	36	38
	W.	3	2	0	2	3	0	2	1	1	0	2	1	3	3	6	5
	S. W.	3	9	7	4	3	6	5	3	13	6	4	2	14	23	14	14
	S.	32	21	22	37	23	11	12	34	31	43	22	25	57	96	78	82
	S. E.	12	2	11	3	4	22	8	9	12	9	15	13	39	36	27	18
	E.	1	2	2	2	4	7	5	4	2	5	8	7	16	15	10	8
	N. E.	4	8	2	8	10	15	13	8	3	5	4	1	36	12	13	20
	Calm.	6	6	15	4	4	4	10	10	11	11	15	23	24	37	35	23
	Blank.	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Lexington, Ky	N.	16	4	2	6	1	15	10	11	6	10	6	3	36	22	23	9
	N. W.	6	8	1	16	15	14	16	18	7	10	5	11	48	22	25	32
	W.	10	21	21	8	11	19	8	10	17	9	5	7	37	31	32	40
	S. W.	18	17	18	13	8	6	9	14	19	16	14	18	29	49	53	39
	S.	22	13	25	32	15	16	11	17	17	16	11	17	44	44	52	72
	S. E.	10	7	8	5	7	5	4	9	4	5	17	18	18	26	35	20
	E.	7	6	3	4	10	12	11	8	7	6	11	5	31	24	18	17
	N. E.	3	12	14	7	14	5	20	5	12	17	22	10	30	51	25	35
	Calm.	1	2	1	2	3	1	1	1	1	4	2	1	3	7	4	6
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Branch, N. J.*	N.	....	....	....	7	11	4	6	3	7	4	12	2	13	23	....	....
	N. W.	....	....	....	26	27	42	26	20	26	13	18	13	88	57	....	....
	W.	....	....	....	5	5	4	5	6	6	1	2	7	15	9	....	....
	S. W.	....	....	....	27	17	15	17	30	15	37	22	16	62	74	....	....
	S.	....	....	....	13	4	9	8	14	16	24	6	10	31	46	....	....
	S. E.	....	....	....	3	4	6	3	8	9	9	14	21	17	32	....	....
	E.	....	....	....	2	4	5	10	6	8	1	12	14	21	21	....	....
	N. E.	....	....	....	11	11	7	13	6	3	3	7	6	26	13	....	....
	Calm.	....	....	....	0	1	1	2	0	0	1	0	1	3	1	....	....
	Blank.	....	....	....	0	0	0	0	0	0	0	0	0	0	0	....	....
Louisville, Ky	N.	12	8	10	9	6	6	12	5	8	4	8	7	23	20	27	25
	N. W.	10	14	4	13	15	15	18	13	8	16	19	5	46	43	29	32
	W.	10	14	10	12	8	15	11	9	7	7	3	13	35	17	37	30
	S. W.	13	9	8	6	4	5	3	10	13	7	2	3	18	22	25	18
	S.	16	12	15	26	15	11	19	9	11	8	9	8	39	28	36	56
	S. E.	0	5	18	5	2	9	10	19	17	14	11	23	38	42	28	25
	E.	1	7	2	6	3	6	3	2	2	2	6	1	11	10	9	11
	N. E.	6	2	9	5	15	7	7	6	6	5	9	1	20	20	9	29
	Calm.	25	19	17	11	16	19	16	20	18	30	26	29	55	74	73	44
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lynchburg, Va	N.	3	3	1	2	4	6	4	8	6	5	8	3	18	19	9	7
	N. W.	14	16	11	14	12	19	9	16	11	1	3	5	44	15	35	37
	W.	8	11	19	7	7	16	4	7	12	8	6	8	27	26	27	33
	S. W.	4	16	13	11	13	2	17	16	13	15	14	5	35	42	25	37
	S.	10	6	8	11	19	13	8	9	16	27	6	8	30	49	24	29
	S. E.	9	1	0	3	1	4	4	5	4	15	7	5	13	26	15	4
	E.	2	3	1	2	6	7	10	11	14	8	13	12	28	35	17	9
	N. E.	3	7	9	10	16	6	22	12	8	6	23	12	40	37	22	35
	Calm.	40	27	31	33	15	20	12	9	6	8	13	32	41	27	99	79
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marquette, Mich	N.	10	8	3	4	7	10	16	10	4	6	9	3	36	19	21	14
	N. W.	20	31	28	31	23	33	21	30	15	14	13	14	84	42	65	82
	W.	18	18	22	17	10	8	10	4	5	12	7	14	22	24	50	49
	S. W.	10	11	10	5	6	13	8	12	7	18	5	17	33	30	38	21
	S.	10	6	7	16	12	4	8	6	4	9	15	17	18	28	33	35
	S. E	10	6	11	6	8	3	7	10	13	11	9	11	20	33	27	25
	E.	6	1	1	2	4	2	8	7	9	9	8	6	17	26	13	7
	N. E.	3	2	2	4	5	5	2	5	6	3	10	2	12	19	7	11
	Calm.	6	7	9	8	9	15	10	9	27	11	17	6	34	55	19	26
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Observations began December 10, 1873.

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Memphis, Tenn.	N.	16	6	1	3	1	5	2	2	1	4	0	4	9	5	26	5
	N. W.	18	19	25	22	20	20	22	21	11	16	13	16	63	40	53	67
	W.	6	6	0	0	0	0	4	3	1	5	1	0	7	7	12	0
	S. W.	15	20	13	15	15	8	18	27	26	25	24	9	53	75	44	43
	S.	10	13	7	4	0	8	1	4	8	7	5	1	13	20	24	11
	S. E.	4	9	19	26	13	21	16	13	15	9	8	11	50	32	24	58
	E.	9	3	1	3	3	1	3	0	0	0	0	1	4	0	13	7
	N. E.	8	13	22	12	31	23	24	11	20	13	12	7	63	45	28	71
	Calm.	7	1	5	2	1	2	0	12	8	14	30	41	14	52	49	8
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Milwaukee, Wis.	N.	4	9	3	5	2	2	6	3	0	3	4	2	11	7	15	10
	N. W.	15	27	30	35	26	39	17	9	11	7	4	16	65	22	58	91
	W.	23	14	7	6	10	9	5	2	17	13	3	7	16	33	44	23
	S. W.	17	15	32	27	18	18	15	24	11	23	13	31	57	47	63	77
	S.	5	2	4	5	2	0	2	7	8	3	0	3	9	11	10	11
	S. E.	9	8	8	7	11	11	17	15	22	20	23	20	43	65	37	26
	E.	10	0	1	1	6	6	1	10	5	4	5	2	17	14	12	8
	N. E.	4	7	5	7	7	8	27	22	16	18	40	9	57	74	20	19
	Calm.	6	8	3	0	2	0	0	1	0	2	1	0	1	3	14	5
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mobile, Ala.	N.	35	16	23	21	19	19	17	18	11	11	6	18	54	28	69	63
	N. W.	2	10	5	5	4	2	9	12	5	7	5	6	23	17	18	14
	W.	2	3	1	1	0	0	3	5	7	7	11	5	8	25	10	2
	S. W.	1	7	1	1	4	2	6	8	22	22	18	5	16	62	13	6
	S.	11	10	13	23	22	36	27	32	22	16	26	16	95	64	37	58
	S. E.	5	7	12	12	8	5	7	1	6	11	6	14	13	23	26	32
	E.	2	5	4	2	1	1	2	5	12	11	7	18	8	30	25	7
	N. E.	13	7	16	16	11	14	8	9	5	5	14	8	31	24	28	43
	Calm.	22	25	18	12	15	14	11	3	0	3	0	0	28	3	47	45
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montgomery, Ala.	N.	5	3	8	7	26	8	5	13	4	6	10	6	26	20	11	41
	N. W.	19	13	16	21	12	22	15	14	6	7	12	11	51	25	40	49
	W.	8	17	6	6	3	5	11	8	16	10	5	2	24	31	26	15
	S. W.	0	4	4	8	2	7	10	11	8	6	8	2	28	22	5	14
	S.	7	7	7	6	8	14	19	8	10	11	8	1	41	29	15	21
	S. E.	4	25	12	25	15	12	10	10	11	13	16	6	32	40	34	52
	E.	10	17	15	7	3	6	9	11	18	21	14	34	26	53	54	25
	N. E.	6	4	10	4	3	5	3	4	12	2	5	9	12	19	17	17
	Calm.	22	20	15	9	11	14	8	14	5	17	15	18	36	37	58	35
	Blank.	12	0	0	0	1	0	0	0	0	0	0	1	0	0	13	1
Morgantown, W. Va.	N.	11	14	4	5	5	5	20	9	9	12	8	12	34	29	37	14
	N. W.	8	18	4	8	7	17	18	11	8	12	7	9	46	27	35	19
	W.	13	17	21	13	12	20	4	9	4	6	4	5	33	14	35	46
	S. W.	19	16	16	19	13	18	16	13	16	9	12	10	47	37	45	48
	S.	15	2	15	23	13	9	12	14	15	17	13	12	35	45	29	51
	S. E.	0	3	2	9	7	8	6	2	7	8	9	8	16	24	11	18
	E.	0	4	2	1	2	1	3	2	0	1	8	0	6	9	4	5
	N. E.	0	4	4	7	13	5	9	4	4	9	7	23	17	11	24	
	Calm.	27	12	25	8	12	10	2	24	27	24	23	27	36	74	66	45
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Washington, N. H.	N.	3	3	1	0	0	7	14	8	8	11	18	26	29	37	32	3
	N. W.	32	63	72	52	49	57	43	56	50	37	46	33	156	133	128	173
	W.	16	6	7	14	12	12	10	10	15	15	6	4	32	36	26	33
	S. W.	21	5	3	21	13	9	5	6	7	16	4	6	20	27	32	37
	S.	4	0	3	0	2	2	4	6	1	10	4	4	12	15	8	5
	S. E.	9	9	3	3	3	1	3	2	1	0	1	13	6	2	31	9
	E.	2	4	0	0	0	0	7	1	0	1	6	1	8	7	7	0
	N. E.	6	0	1	1	1	0	2	2	6	2	5	0	4	13	6	3
	Calm.	0	0	3	2	2	5	2	2	2	1	3	3	9	6	3	7
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nashville, Tenn.	N.	6	1	2	9	6	14	13	6	2	4	5	5	33	11	12	17
	N. W.	12	13	6	13	15	14	15	8	8	5	9	7	37	22	32	34
	W.	9	15	7	7	6	7	4	12	12	4	7	1	23	23	25	20
	S. W.	4	6	3	1	2	4	6	1	14	12	6	0	11	32	10	6
	S.	13	9	16	21	11	10	9	10	5	6	2	3	29	13	25	48
	S. E.	4	1	5	6	6	9	9	4	7	7	7	6	22	21	11	17
	E.	6	3	1	1	7	8	2	4	8	6	12	10	14	26	19	9
	N. E.	4	3	2	5	9	3	6	6	2	8	4	3	15	14	10	16
	Calm.	35	39	51	30	22	24	26	42	32	41	41	55	92	114	129	103
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
New Haven, Conn...	N.	21	12	16	7	21	12	16	9	12	11	19	7	37	42	40	44
	N. W.	9	23	15	13	17	26	21	11	12	7	0	10	58	29	42	45
	W.	7	24	10	12	7	11	11	8	7	5	6	7	30	18	38	29
	S. W.	14	7	9	15	4	13	13	14	8	18	14	11	40	40	32	28
	S.	15	2	4	12	4	11	8	24	24	35	15	12	43	74	29	20
	S. E.	8	0	1	0	3	3	1	7	3	2	4	6	11	9	14	4
	E.	2	1	1	2	1	0	1	1	3	0	3	8	2	6	11	4
	N. E.	8	13	16	13	18	8	18	7	8	7	18	22	33	33	43	47
	Calm.	9	8	21	19	9	9	1	12	13	8	4	7	22	25	24	49
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New London, Conn..	N.	32	19	12	6	10	4	11	4	5	6	14	13	19	25	64	28
	N. W.	8	38	27	24	32	39	25	19	21	10	18	17	83	49	63	83
	W.	3	14	15	10	16	11	6	3	6	3	3	7	20	12	24	44
	S. W.	18	7	10	24	7	15	21	25	15	20	18	9	61	53	34	41
	S.	5	0	6	11	5	10	6	5	12	16	9	6	21	37	11	22
	S. E.	14	2	2	5	6	3	3	17	14	23	8	10	23	47	26	13
	E.	1	1	2	2	2	5	2	3	5	2	6	5	10	13	7	6
	N. E.	7	8	4	6	5	0	14	11	7	2	14	14	25	23	29	15
	Calm.	5	1	12	5	1	6	2	6	5	9	3	9	14	17	15	18
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Orleans, La	N.	15	3	15	8	10	6	9	4	3	4	2	12	19	9	30	33
	N. W.	20	23	9	12	12	5	9	14	8	12	13	6	28	33	49	33
	W.	3	10	4	3	2	2	5	5	23	19	13	6	12	55	19	9
	S. W.	3	7	5	10	8	15	7	10	16	10	13	5	32	39	15	23
	S.	5	6	8	16	8	17	15	10	5	2	7	3	42	14	14	32
	S. E.	16	17	16	18	19	21	18	30	14	20	18	12	69	52	45	53
	E.	17	12	19	9	9	8	7	6	9	15	11	27	21	35	56	37
	N. E.	10	10	14	15	15	12	13	9	5	10	8	18	34	23	38	44
	Calm.	4	2	3	2	1	7	7	5	7	1	8	1	19	16	7	6
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New York, N. Y	N.	10	2	5	7	15	5	7	19	0	6	7	4	12	13	16	27
	N. W.	19	29	24	14	27	26	21	15	21	13	19	14	66	53	62	65
	W.	12	31	15	18	10	24	11	16	12	6	6	9	50	24	52	43
	S. W.	14	8	14	16	7	14	16	12	12	16	20	11	46	48	33	37
	S.	13	3	5	18	2	7	6	15	12	22	6	11	25	40	27	25
	S. E.	11	1	1	2	3	6	5	6	14	20	9	7	26	43	19	6
	E.	5	3	3	4	6	4	7	9	7	3	4	18	17	14	26	13
	N. E.	6	9	20	9	12	7	17	1	10	5	19	12	33	34	27	41
	Calm.	3	4	6	5	2	0	0	0	2	2	3	4	1	7	11	13
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norfolk, Va.....	N.	16	11	11	9	16	12	14	12	7	6	6	9	38	19	36	36
	N. W.	12	11	10	13	12	11	4	7	6	0	10	3	32	16	26	35
	W.	2	7	4	4	1	9	6	3	7	1	4	6	18	12	15	9
	S. W.	8	18	21	15	10	12	15	15	30	38	16	3	42	84	29	46
	S.	20	13	7	28	15	9	9	12	13	11	6	13	30	30	46	50
	S. E.	13	7	8	4	2	12	8	15	10	15	13	18	35	38	38	14
	E.	7	7	5	2	5	8	12	13	9	8	7	11	33	24	25	12
	N. E.	9	11	17	15	20	16	16	14	8	8	30	15	46	46	35	52
	Calm.	6	5	10	3	3	4	6	2	0	6	1	12	12	7	23	16
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Omaha, Nebr.....	N.	9	8	8	16	14	27	23	18	9	13	16	20	68	38	37	38
	N. W.	32	29	22	19	14	14	5	7	16	1	3	9	26	20	60	55
	W.	9	7	8	8	2	3	4	4	5	0	1	2	11	6	18	18
	S. W.	9	4	5	3	6	5	8	4	7	27	7	9	17	41	22	14
	S.	20	20	22	25	16	7	12	25	35	27	19	25	44	81	65	63
	S. E.	9	8	4	8	5	11	8	13	9	8	15	11	32	32	28	17
	E.	2	2	3	0	7	5	6	5	3	4	2	1	16	9	5	10
	N. E.	3	1	4	3	4	6	9	4	1	5	9	3	19	15	7	11
	Calm.	10	11	17	11	16	15	15	13	5	8	21	10	43	34	31	44
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oswego, N. Y.....	N.	6	8	2	3	1	9	5	9	7	3	8	12	23	18	26	6
	N. W.	22	27	13	18	25	36	33	19	24	18	20	11	88	62	60	56
	W.	8	6	13	7	6	11	6	24	16	12	5	4	41	33	18	26
	S. W.	10	9	13	7	3	11	5	6	7	11	11	4	22	29	23	23
	S.	20	12	20	25	14	6	9	11	12	20	22	29	26	54	61	69
	S. E.	12	19	23	20	20	16	16	8	9	10	8	18	40	27	49	63
	E.	1	5	1	3	1	1	1	0	1	3	2	2	2	6	8	5
	N. E.	8	4	8	9	10	2	14	10	7	13	13	7	26	33	19	27
	Calm.	6	0	0	0	4	1	1	6	7	3	4	3	8	14	9	4
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Peck's Beach, N. Y. *	N.	....	....	....	5	19	6	9	4	10	2	7	6	19	19	....	....
	N. W.	....	....	....	11	13	25	14	18	8	4	7	5	57	19	....	....
	W.	....	....	....	20	13	12	8	17	16	5	3	11	37	24	....	....
	S. W.	....	....	....	12	2	12	11	16	16	29	16	9	39	61	....	....
	S.	....	....	....	26	16	15	7	10	14	27	8	6	32	49	....	....
	S. E.	....	....	....	6	3	11	7	12	5	10	8	17	30	23	....	....
	E.	....	....	....	5	7	6	14	12	15	8	23	31	32	46	....	....
	N. E.	....	....	....	8	10	4	20	4	5	6	17	4	28	28	....	....
	Calm.	....	....	....	0	1	2	0	0	1	2	4	1	2	7	....	....
	Blank.	....	....	....	0	0	0	0	0	0	0	0	0	0	0	....	....
Pembina, Dak.	N.	0	6	0	1	0	0	0	1	0	0	0	0	1	0	6	1
	N. W.	49	30	38	43	30	48	42	38	22	37	24	27	128	83	106	111
	W.	0	1	0	0	0	4	1	0	0	2	0	0	5	2	1	0
	S. W.	9	3	4	4	5	8	7	2	7	6	8	13	17	21	25	13
	S.	6	1	1	1	0	0	0	0	0	1	0	0	0	1	7	2
	S. E.	17	22	40	35	41	22	24	23	31	33	36	32	69	100	71	116
	E.	0	0	0	0	0	0	2	1	1	0	0	0	3	1	0	0
	N. E.	4	10	2	5	3	6	9	24	17	6	6	2	39	29	16	10
	Calm.	8	17	8	4	5	5	5	4	12	8	19	16	14	39	41	17
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philadelphia, Pa.	N.	20	7	11	5	13	12	11	10	11	14	17	10	33	42	37	29
	N. W.	11	32	22	23	20	26	14	10	11	4	7	8	50	22	51	65
	W.	11	16	12	11	9	12	7	24	15	12	7	9	43	34	36	32
	S. W.	20	10	19	23	7	21	17	17	16	25	12	8	55	53	38	49
	S.	10	2	2	6	5	5	3	13	11	21	7	7	21	39	19	13
	S. E.	4	2	1	1	1	1	4	1	6	3	5	6	6	14	12	3
	E.	7	5	9	13	13	7	18	11	9	6	14	22	36	29	34	35
	N. E.	9	14	14	9	15	9	15	7	8	5	15	7	31	28	30	38
	Calm.	1	2	3	2	1	0	1	0	3	3	9	13	1	15	16	6
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pike's Peak, Colo. †	N.	...	20	18	7	13	2	34	17	2	7	3	18	53	12	....	38
	N. W.	....	19	20	36	15	14	9	14	9	5	8	13	37	22	....	71
	W.	...	28	26	35	22	29	18	25	34	7	17	17	72	58	....	89
	S. W.	...	12	23	13	23	46	18	12	32	23	31	20	76	86	....	59
	S.	....	1	1	0	2	2	5	13	8	17	20	4	20	45	....	3
	S. E.	....	0	1	1	1	0	3	4	4	6	4	3	7	14	....	3
	E.	....	0	2	0	0	0	0	4	1	8	6	4	4	15	....	2
	N. E.	....	7	1	0	0	0	2	2	0	19	3	11	4	22	....	1
	Calm.	....	3	1	1	2	0	1	2	0	1	1	0	3	2	....	4
	Blank.	....	0	0	0	0	0	0	0	0	0	0	0	0	0	....	0
Pittsburgh, Pa	N.	9	8	2	2	8	8	11	13	14	15	14	15	32	43	32	12
	N. W.	21	20	20	18	21	26	24	26	26	21	14	12	76	61	53	59
	W.	14	21	15	14	16	17	11	14	6	8	7	9	42	21	43	45
	S. W.	11	13	9	12	9	13	6	8	12	21	8	11	27	41	35	30
	S.	16	5	16	15	4	8	9	7	8	8	6	6	24	22	27	35
	S. E.	7	5	2	5	7	4	2	5	4	1	11	4	11	16	16	14
	E.	4	5	11	7	4	7	10	4	8	5	6	11	21	19	20	22
	N. E.	1	8	12	17	13	9	17	8	7	6	23	12	34	36	21	42
	Calm.	10	6	6	3	2	1	0	8	5	8	4	10	9	17	26	11
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Port Huron, Mich. ‡	N.	....	....	....	....	....	....	....	....	....	....	16	7	....	....	....	....
	N. W.	....	....	....	....	....	....	....	....	....	....	6	9	....	....	....	....
	W.	....	....	....	....	....	....	....	....	....	....	0	9	....	....	....	....
	S. W.	....	....	....	....	....	....	....	....	....	....	9	10	....	....	....	....
	S.	....	....	....	....	....	....	....	....	....	....	5	31	....	....	....	....
	S. E.	....	....	....	....	....	....	....	....	....	....	12	9	....	....	....	....
	E.	....	....	....	....	....	....	....	....	....	....	6	2	....	....	....	....
	N. E.	....	....	....	....	....	....	....	....	....	....	27	6	....	....	....	....
	Calm.	....	....	....	....	....	....	....	....	....	....	12	7	....	....	....	....
	Blank.	....	....	....	....	....	....	....	....	....	....	0	0	....	....	....	....
Portland, Me.	N.	19	13	4	21	13	5	8	8	5	2	5	9	21	12	41	38
	N. W.	10	19	23	16	27	35	20	14	10	6	16	12	69	32	41	66
	W.	7	11	14	7	10	11	13	7	13	8	6	4	31	27	22	31
	S. W.	12	14	13	17	8	15	16	13	12	26	21	18	44	59	44	38
	S.	18	2	6	9	6	12	10	10	13	18	7	13	32	38	33	21
	S. E.	7	1	1	0	2	1	4	14	6	8	9	8	19	23	16	3
	E.	3	2	6	0	2	2	1	2	5	5	3	7	5	13	12	8
	N. E.	2	8	6	3	5	1	11	9	11	10	9	5	21	30	15	14
	Calm.	15	20	20	20	11	11	7	16	15	10	17	14	34	42	49	51
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Observations began December 10, 1873. † Observations began November 1, 1873.
‡ Observations began July 25, 1874.

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Table showing how many times the wind was observed blowing, &c.—Continued

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Portland, Oreg	N.	1	3	5	3	4	11	9	14	15	38	15	11	34	68	15	12
	N. W.	30	16	21	7	8	12	14	15	23	28	17	20	41	68	66	36
	W.	12	10	0	0	3	6	2	6	3	2	4	0	14	9	22	3
	S. W.	2	1	4	6	6	8	12	4	7	3	8	4	24	15	7	16
	S.	1	4	15	53	37	30	25	21	19	6	14	17	76	39	22	105
	S. E.	15	18	11	5	8	5	5	3	0	1	3	3	13	4	36	24
	E.	7	9	25	4	6	9	2	4	1	0	0	3	15	1	19	35
	N. E.	3	5	3	0	2	1	0	2	0	0	2	2	3	2	10	5
	Calm.	22	24	9	15	10	11	21	21	22	15	30	30	56	67	76	34
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Punta Rassa, Fla.	N.	21	13	12	7	6	11	6	10	1	1	9	1	27	11	35	25
	N. W.	2	9	11	7	5	6	10	13	6	9	5	7	29	20	18	24
	W.	1	6	3	5	5	15	6	21	8	6	16	4	42	30	11	13
	S. W.	6	11	6	3	8	11	6	10	14	16	15	8	27	45	25	17
	S.	0	6	6	12	21	17	22	8	11	9	3	3	47	23	9	39
	S. E.	4	2	5	4	8	7	10	4	9	11	3	7	21	23	13	17
	E.	24	11	30	19	17	17	20	12	33	18	11	38	49	62	73	66
	N. E.	34	28	18	35	13	8	9	13	7	20	24	20	30	51	82	66
	Calm.	1	4	2	1	1	1	1	2	1	3	7	2	4	11	7	4
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rochester, N. Y.	N.	4	3	3	1	0	1	5	7	9	9	11	8	13	29	15	4
	N. W.	13	27	15	15	16	27	18	19	10	12	11	9	64	33	49	46
	W.	22	21	24	19	22	30	23	22	23	20	11	11	81	59	54	69
	S. W.	24	18	22	21	11	16	10	9	16	28	24	20	35	68	62	54
	S.	12	5	10	17	5	6	6	8	5	4	3	15	29	12	32	32
	S. E.	10	13	6	10	17	9	11	4	8	5	9	11	24	22	34	33
	E.	1	3	7	4	9	1	10	7	6	4	6	3	18	16	7	20
	N. E.	6	0	2	6	4	3	7	10	6	9	13	10	20	29	16	12
	Calm.	1	0	0	0	0	0	0	1	2	2	5	3	1	9	4	0
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salt Lake City, Utah.*	N.	....	....	....	....	....	....	9	13	7	5	5	7	....	17	....	....
	N. W.	....	....	....	....	....	....	16	11	18	23	8	26	....	49	....	....
	W.	....	....	....	....	....	....	1	6	1	1	0	1	....	2	....	....
	S. W.	....	....	....	....	....	....	3	7	2	4	7	0	....	13	....	....
	S.	....	....	....	....	....	....	16	16	12	9	10	5	....	31	....	....
	S. E.	....	....	....	....	....	....	10	12	17	11	17	10	....	45	....	....
	E.	....	....	....	....	....	....	10	3	7	7	11	3	....	25	....	....
	N. E.	....	....	....	....	....	....	15	19	22	14	14	16	....	50	....	....
	Calm.	....	....	....	....	....	....	10	6	4	19	21	22	....	44	....	....
	Blank.	....	....	....	....	....	....	0	0	0	0	0	0	....	0	....	....
San Diego, Cal.	N.	15	21	15	14	9	14	10	12	9	3	7	19	36	19	55	37
	N. W.	22	13	16	12	7	10	9	7	15	14	17	16	26	46	57	35
	W.	17	13	13	11	15	32	30	28	19	29	25	17	90	73	47	39
	S. W.	5	5	3	2	7	5	3	13	18	15	15	5	21	48	15	13
	S.	4	4	10	12	8	1	7	15	10	24	15	3	23	49	11	30
	S. E.	7	5	5	3	3	2	3	2	4	0	1	1	7	5	13	11
	E.	4	10	5	8	10	4	5	3	1	0	0	5	12	1	19	23
	N. E.	13	11	20	16	18	5	6	2	3	1	2	2	13	6	26	54
	Calm.	6	8	6	16	7	20	17	11	11	7	11	22	48	29	36	29
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sandy Hook, N. J. †	N.	....	....	....	2	3	2	3	2	3	7	9	7	7	19	....	....
	N. W.	....	....	....	31	35	40	27	22	19	6	7	7	89	32	....	....
	W.	....	....	....	10	6	4	1	3	18	11	13	15	8	42	....	....
	S. W.	....	....	....	17	5	21	16	20	5	19	10	5	57	34	....	....
	S.	....	....	....	8	1	1	2	5	7	14	8	8	8	29	....	....
	S. E.	....	....	....	7	7	3	10	22	19	27	18	22	35	64	....	....
	E.	....	....	....	5	7	4	8	3	6	1	5	15	15	12	....	....
	N. E.	....	....	....	9	18	7	16	8	7	4	23	9	31	34	....	....
	Calm.	....	....	....	4	2	11	7	8	6	4	0	2	26	10	....	....
	Blank.	....	....	....	0	0	0	0	0	0	0	0	0	0	0	....	....
San Francisco, Cal.	N.	8	5	9	12	14	3	4	0	0	0	0	0	7	0	13	35
	N. W.	10	17	6	24	11	6	4	4	0	0	0	4	14	0	31	41
	W.	4	2	2	6	11	30	36	17	13	4	21	9	83	34	15	19
	S. W.	40	33	20	10	18	30	29	58	67	87	67	62	117	121	125	48
	S.	0	0	3	6	3	11	4	1	2	1	2	0	16	5	0	12
	S. E.	8	11	21	9	8	2	1	6	1	0	0	0	9	1	19	38
	E.	0	0	2	0	0	0	0	0	1	0	0	0	0	1	0	2
	N. E.	6	10	23	15	5	6	6	2	4	0	0	0	14	4	16	43
	Calm.	17	14	7	11	14	5	6	5	2	1	3	15	16	6	44	32
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Observations began March 15, 1874.

† Observations began December 10, 1873.

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Santa Fé, N. M.	N.	11	18	32	24	13	16	9	6	7	15	17	4	31	39	33	69
	N. W.	9	9	10	16	14	5	13	10	7	3	10	4	32	20	32	40
	W.	4	4	10	4	1	7	7	8	7	2	4	9	22	13	17	15
	S. W.	13	12	6	12	16	20	9	14	16	8	16	11	43	40	36	34
	S.	12	5	6	5	8	8	8	12	8	13	6	8	28	27	25	19
	S. E.	10	4	12	8	11	11	11	14	20	19	14	12	36	33	26	31
	E.	14	17	8	8	12	10	19	19	11	19	12	25	48	42	56	28
	N. E.	5	7	3	8	3	7	5	3	6	7	7	12	15	20	24	14
	Calm.	15	14	6	8	6	9	9	7	8	7	7	5	25	22	34	20
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Savannah, Ga	N.	10	2	16	14	8	7	3	4	2	8	12	18	14	22	30	38
	N. W.	32	26	31	21	16	14	8	8	7	9	6	5	30	22	63	68
	W.	4	17	9	13	6	17	16	11	4	1	4	5	44	9	26	28
	S. W.	11	15	10	3	7	14	9	15	20	11	17	6	34	48	32	20
	S.	3	5	4	13	11	16	28	14	17	16	8	4	58	41	12	28
	S. E.	8	3	4	7	11	6	10	8	21	20	8	12	24	49	23	22
	E.	4	4	9	9	7	3	5	7	6	9	10	13	15	25	21	25
	N. E.	18	8	8	10	9	11	10	20	9	11	22	19	41	42	45	27
	Calm.	3	10	2	3	9	5	1	6	4	8	6	8	12	18	21	14
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shreveport, La.	N.	15	11	8	10	8	14	9	8	7	9	5	10	31	21	36	26
	N. W.	11	14	9	7	9	9	12	7	7	2	3	5	28	12	30	25
	W.	3	7	3	5	7	6	8	8	5	3	5	5	22	13	15	15
	S. W.	6	10	7	7	9	2	5	8	9	10	9	0	15	28	16	23
	S.	6	14	19	24	7	13	20	15	18	20	18	6	42	56	26	50
	S. E.	18	10	9	5	10	12	9	16	19	12	14	4	37	45	32	24
	E.	8	6	14	13	13	16	8	11	7	21	7	26	35	35	40	40
	N. E.	14	8	11	14	14	19	10	4	2	6	6	6	33	14	28	39
	Calm.	12	10	13	8	7	2	9	16	16	10	26	28	27	52	50	28
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Squan Beach, N. J. *	N.	....	....	....	6	6	3	1	1	2	3	12	7	5	17	....	....
	N. W.	....	....	....	14	29	30	22	6	18	11	13	4	58	42	....	....
	W.	....	....	....	21	9	8	6	7	7	6	7	9	21	20	....	....
	S. W.	....	....	....	10	5	15	8	25	15	17	5	7	48	37	....	....
	S.	....	....	....	16	5	5	8	5	6	33	14	7	17	53	....	....
	S. E.	....	....	....	5	5	14	5	24	19	14	2	24	43	35	....	....
	E.	....	....	....	3	4	2	7	3	7	3	7	12	12	17	....	....
	N. E.	....	....	....	13	16	11	21	16	12	4	26	19	48	42	....	....
	Calm.	....	....	....	5	5	5	12	7	4	2	7	4	24	13	....	....
	Blank.	....	....	....	0	0	0	0	0	0	0	0	0	0	0	....	....
Saint Louis Mo	N.	13	8	4	11	15	26	26	16	10	21	16	12	68	47	33	30
	N. W.	13	19	11	14	15	13	10	12	5	4	7	6	35	16	38	40
	W.	9	14	19	11	10	6	6	2	5	8	5	4	14	18	27	40
	S. W.	7	6	8	3	2	4	7	13	16	13	4	3	24	33	16	13
	S.	28	13	26	25	17	14	4	25	29	26	19	27	43	74	68	68
	S. E.	8	11	5	15	10	11	13	14	11	3	14	24	38	28	43	30
	E.	5	10	8	2	4	14	10	8	7	5	16	9	32	28	24	14
	N. E.	4	5	7	7	9	3	13	2	4	11	11	3	18	26	12	23
	Calm.	6	4	5	5	2	2	1	1	3	2	1	2	4	6	12	12
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saint Paul, Minn.	N.	11	9	1	8	5	8	19	20	8	7	12	7	47	27	27	14
	N. W.	19	27	18	18	14	24	18	12	9	19	9	16	54	37	62	50
	W.	7	10	9	11	8	20	11	7	6	6	3	5	38	15	22	28
	S. W.	12	7	18	5	12	13	4	5	6	9	6	13	22	21	32	35
	S.	10	7	13	11	5	4	9	16	16	12	5	17	29	33	34	29
	S. E.	16	8	18	29	18	16	12	14	26	22	31	21	42	79	45	65
	E.	10	14	15	7	11	4	4	8	11	6	15	4	16	32	28	33
	N. E.	7	6	0	0	2	1	9	9	5	3	7	2	19	15	15	2
	Calm.	1	2	1	4	9	3	4	2	3	9	5	5	9	17	8	14
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saint Paul's Island, Alaska.	N.	16	22	13	10	5	15	18	18	7	....	....	....	51	....	....	28
	N. W.	25	17	10	5	6	7	11	11	10	....	....	....	29	....	....	21
	W.	16	7	12	10	16	15	0	6	20	....	....	....	21	....	....	38
	S. W.	4	6	18	10	12	11	5	9	14	....	....	....	25	....	....	40
	S.	6	7	23	21	22	12	3	6	21	....	....	....	21	....	....	66
	S. E.	3	11	8	7	10	9	22	8	7	....	....	....	39	....	....	25
	E.	15	14	4	20	8	16	18	16	4	....	....	....	50	....	....	32
	N. E.	6	5	2	9	5	7	13	19	5	....	....	....	39	....	....	16
	Calm.	2	1	3	1	0	1	0	0	2	....	....	....	1	....	....	4
	Blank.	0	0	0	0	0	0	0	0	0	....	....	....	0	....	....	0

* Observations began December 10, 1874.

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Toledo, Ohio	N.	4	5	5	7	4	4	11	11	7	18	11	12	26	36	21	16
	N. W.	7	12	6	8	10	13	9	5	1	0	2	6	27	3	25	24
	W.	17	12	21	12	21	35	12	25	27	15	9	10	72	51	39	54
	S. W.	30	26	25	24	10	19	9	2	2	4	7	13	30	13	69	59
	S.	17	12	10	25	7	4	1	15	13	25	13	20	20	51	49	42
	S. E.	6	7	5	7	1	1	3	7	3	7	5	7	11	15	20	13
	E.	7	8	9	3	15	11	21	10	16	9	8	9	42	33	24	27
	N. E.	4	4	7	6	15	6	19	17	17	10	31	12	42	58	20	28
	Calm.	1	4	5	1	1	0	5	1	4	5	7	1	6	16	6	7
	Blank.	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
Tybee Island, Ga*	N.	....	....	....	....	....	....	....	....	....	1	9	....	....	....	....	....
	N. W.	....	....	....	....	....	....	....	....	....	3	2	....	....	....	....	....
	W.	....	....	....	....	....	....	....	....	....	6	11	....	....	....	....	....
	S. W.	....	....	....	....	....	....	....	....	....	6	7	....	....	....	....	....
	S.	....	....	....	....	....	....	....	....	....	28	14	....	....	....	....	....
	S. E.	....	....	....	....	....	....	....	....	....	17	6	....	....	....	....	....
	E.	....	....	....	....	....	....	....	....	....	16	23	....	....	....	....	....
	N. E.	....	....	....	....	....	....	....	....	....	14	21	....	....	....	....	....
	Calm.	....	....	....	....	....	....	....	....	....	2	0	....	....	....	....	....
	Blank.	....	....	....	....	....	....	....	....	....	0	0	....	....	....	....	....
Vicksburg, Miss	N.	25	8	12	18	16	15	9	7	6	6	4	12	31	16	45	46
	N. W.	9	15	3	6	9	5	11	13	8	9	17	12	29	34	36	18
	W.	1	4	4	1	6	3	5	10	1	2	1	0	18	4	5	11
	S. W.	3	10	14	5	6	7	10	8	14	13	18	6	25	45	19	25
	S.	7	8	14	16	14	15	18	17	12	16	19	1	50	37	16	44
	S. E.	14	18	15	9	7	12	14	16	20	7	13	6	42	40	38	31
	E.	6	5	8	12	10	15	8	9	7	12	4	18	32	23	29	30
	N. E.	10	2	13	21	8	15	8	3	3	12	7	12	26	22	24	42
	Calm.	18	20	10	5	8	6	7	10	19	16	20	23	23	55	61	23
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Virginia City, Mon't. †	N.	....	0	2	0	2	1	1	4	6	0	....	....	6	....	....	4
	N. W.	....	2	1	5	1	4	5	11	16	6	....	....	20	....	....	7
	W.	....	15	2	16	14	7	10	7	10	11	....	....	24	....	....	32
	S. W.	....	17	6	31	12	18	8	13	15	14	....	....	39	....	....	49
	S.	....	3	1	6	1	7	14	8	6	12	....	....	29	....	....	8
	S. E.	....	2	13	7	14	11	11	13	7	11	....	....	35	....	....	34
	E.	....	19	23	1	1	4	4	10	3	5	....	....	18	....	....	25
	N. E.	....	1	1	2	3	8	12	3	1	5	....	....	23	....	....	6
	Calm.	....	31	44	25	36	33	25	24	26	29	....	....	82	....	....	105
	Blank.	....	0	0	0	0	0	0	0	0	0	....	....	0	....	....	0
Washington, D. C.	N.	8	6	9	7	10	6	8	7	7	12	12	11	21	31	25	26
	N. W.	2	18	22	22	24	35	25	21	17	9	16	14	81	42	53	68
	W.	7	19	17	10	4	8	3	3	6	5	4	10	14	15	36	31
	S. W	11	2	7	8	7	6	13	15	10	9	9	4	34	24	17	22
	S.	25	16	17	29	15	14	8	25	26	46	13	19	47	85	60	61
	S. E.	5	0	2	4	1	4	6	5	6	4	7	7	15	17	12	7
	E.	3	2	2	0	2	4	6	6	6	2	7	7	16	15	12	4
	N. E.	2	15	12	10	12	8	20	7	10	4	20	13	35	34	39	34
	Calm.	11	12	5	3	9	8	1	4	2	2	5	5	13	9	28	17
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wilmington, N. C	N.	14	6	21	10	8	13	6	4	1	3	13	3	21	17	23	39
	N. W.	10	20	13	10	14	12	7	6	4	5	7	6	25	16	36	37
	W.	4	14	4	5	5	14	5	10	9	7	9	2	29	25	23	14
	S. W.	7	15	19	23	12	19	29	22	41	37	16	6	70	95	28	54
	S.	4	1	3	5	7	5	13	8	11	9	5	7	26	25	12	15
	S. E.	11	2	3	13	4	9	8	14	8	9	7	22	31	24	35	20
	E.	5	4	7	6	6	8	10	10	10	6	3	12	28	19	21	19
	N. E.	21	17	15	12	19	10	10	10	1	13	26	22	30	40	60	46
	Calm.	17	11	8	9	9	3	2	9	5	4	7	10	14	16	38	26
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood's Hole, Mass	N.	10	9	13	7	13	1	6	2	8	3	14	9	9	25	28	33
	N. W.	10	44	31	28	34	44	25	9	16	8	10	13	78	34	67	93
	W.	7	13	5	6	6	4	6	6	7	1	2	2	16	10	22	17
	S. W.	19	9	12	21	4	24	18	38	31	56	23	14	80	119	42	37
	S.	7	0	4	11	5	6	6	7	5	14	10	11	19	23	18	20
	S. E.	14	8	8	10	5	11	5	12	7	5	4	15	28	16	37	23
	E.	8	1	6	0	7	1	10	4	6	0	6	9	15	12	18	13
	N. E.	13	5	8	9	9	2	11	8	3	3	13	12	21	19	30	26
	Calm.	5	1	6	1	1	0	3	7	7	3	11	5	10	21	11	8
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

* Observations began June 21, 1874.

† October incomplete.

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Table showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	October, '73.	November.	December.	January, '74.	February.	March.	April.	May.	June.	July.	August.	September.	Spring.	Summer.	Autumn.	Winter.
Wytheville, Va	N.	4	2	0	0	1	1	4	8	15	1	9	3	13	25	9	1
	N. W.	18	22	13	13	15	23	14	18	7	6	3	10	55	16	50	41
	W.	16	23	23	19	12	19	17	30	20	22	20	8	66	62	47	54
	S. W.	1	7	0	8	2	5	4	7	11	7	3	0	16	21	8	10
	S.	5	0	4	5	5	2	3	0	4	5	0	5	5	9	10	14
	S. E.	7	3	1	4	3	4	10	9	8	7	10	9	23	25	19	8
	E.	5	8	11	7	12	3	12	7	5	9	12	13	22	26	26	30
	N. E.	1	0	2	3	1	0	2	1	3	0	2	2	3	5	3	6
	Calm.	36	25	39	34	33	36	24	13	17	36	34	40	73	87	101	106
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yankton, Dak	N.	7	4	3	5	7	7	8	8	2	5	6	2	23	13	13	15
	N. W.	29	37	41	26	24	28	17	13	15	10	10	20	58	35	86	91
	W.	16	5	9	9	4	8	6	7	7	4	1	2	21	12	23	22
	S. W.	10	9	18	14	7	9	9	10	9	22	5	11	28	36	30	39
	S.	9	2	1	9	5	4	6	20	15	7	6	11	30	28	22	15
	S. E.	8	8	8	10	15	17	13	8	23	16	27	16	38	66	32	33
	E.	2	1	1	7	10	5	7	9	8	9	15	7	21	32	10	18
	N. E.	9	18	4	4	5	13	18	16	10	16	17	9	47	43	36	13
	Calm.	3	6	8	9	7	2	6	2	1	4	6	12	10	11	21	24
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PAPER 12.—FORM 2.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE.

Telegraphic report of observations received at Washington, D. C., September 30, 1874, at 8 a. m.

NEW YORK AND SAVANNAH.

Savannah.	Cup.	Flesh.	Tragic.	Brash.	
Beech.	Race.	Earth.	Sky.	0	Gloat.
Jacksonville.	Cup.	Fling.	Traitor.	Blush.	
Buchu.	Race.	Earth.	Sky.	0	Glitter.
Lake.	Cup.	Flint.	Traffic.	Boyle.	
Aral.	Damage.	Earth.	Sky.	0	Glass.
Rassa.	Cup.	Floss.	Trend.	Body.	
Anna.	Deacon.	Hawk.	Sky.	0	Goff.
Charleston.	Cup.	Fleet.	Trailing.	Bride.	
Cherry.	Race.	Earth.	Fog.	0	Globe.
Augusta.	Cup.	Fling.	Town.	Brown.	
Aral.	Rage.	Earth.	Sky.	0	Glance.
Orleans.	Cup.	Foal.	Treble.	Blush.	
Eliza.	Damp.	Moon.	Smoke.	0	Gobble.
Indianola.	Cup.	Folks.	Treble.	Buchu.	
Amy.	Dance.	Pallas.	Ant	0	Gobble.
Corsicana.	Cup.	Foist.	Traduce.	Brandish.	
Danube.	Damage.	Earth.	Sky.	0	Blank.
Galveston.	Cup.	Foist.	Treble.	Brandish.	
Aral.	Rank.	Neptune.	Sky.	0	Gobble.
Mobile.	Cup.	Foal.	Trade.	Box.	
Agnes.	Raid.	Earth.	Sky.	0	Gleam.
Montgomery.	Cup.	Flute.	Town.	Brad.	
Aral.	Raft.	Earth.	Sky.	0	Glance.
Wilmington.	Cup.	Flap.	Traffic.	Book.	
Aral.	Raid.	Earth.	Sky.	0	Gleam.
Norfolk.	Cup.	Filial.	Trade.	Brandish.	
Danube.	Rank.	Mars.	Sky.	0	Glass.
Washington.	Cup.	Fillet.	Trade.	Bowl.	
Huron.	Ranche.	Peach.	Smoke.	0	Gladly.
Knoxville.	Cup.	Fleet.	Total.	Bring.	
China.	Ranche.	Petrel.	Sky.	0	Give.

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Lynchburg.	Cup.	Finger.	Traffic.	Botch.	
Danube.	Dale.	Earth.	Sky.	0	Gladden.
Baltimore.	Cup.	File.	Trade.	Box.	
Huron.	Rank.	Duck.	Sky.	0	Glance.
Philadelphia.	Cup.	Fight.	Trade.	Bloom.	
Baltic.	Flesh.	Calf.	Sky.	0	Blank.
May.	Cup.	Filch.	Tragic.	Boyle.	
Danube.	Rebate.	Earth.	Sky.	Aden.	Gloat.
York.	Cup.	Fiddle.	Town.	Brain.	
Danube.	Deceit.	Mars.	Smoke.	Abide.	Glance.
Albany.	Cup.	Ferrule.	Towel.	Bring.	
Caspian.	Rage.	Hidden.	Wales.	Aglow.	Glad.
Oswego.	Cup.	Few.	Towel.	Bread.	
Caspian.	Rattle.	Hidden.	Wales	0	Glance.
Rochester.	Cup.	Fiddle.	Total.	Bread.	
Garden.	Decrease.	Hidden.	Three.	Abide.	Glad.
Buffalo.	Cup.	Fifth.	Torpid.	Book.	
Caspian.	Ready.	Hidden.	Wales.	Abbot.	Gird.
Erie.	Cup.	Filch.	Toulon.	Bow.	
Caspian.	Reach.	Hidden.	Nine.	Actor.	Gladden.
Cleveland.	Cup.	Finding.	Touch.	Brain.	
Caspian.	Rebuke.	Hidden.	Wales.	0	Glad.
Toledo.	Cup.	Flag.	Topaz.	Blush.	
Aral.	Rat.	Earth.	Sky.	0	Gensing.
Detroit.	Cup.	Fiscal.	Tone.	Brandish.	
Aral.	Rapping.	Earth.	Sky.	0	Gingham.
Haven.	Cup.	Flesh.	Topeka.	Boyle.	
Grace.	Rapid.	Hidden.	Bug.	0	Gird.
Huron.	Cup.	Finland.	Topaz.	Box.	
Baltic.	Decide.	Pear.	Sky.	0	Gensing.
Alpena.	Cup.	Fixing.	Token.	Bridal.	
Caspian.	Rank.	Hidden.	Wales.	Absent.	Gin.
Eastport.	Cup.	Feeble.	Tragic.	By	
Grant.	Deem.	Hidden.	Clover.	Akin.	Gleam.
Portland.	Cup.	Fatling.	Tragic.	Build.	
Malta.	Data.	Hidden.	Fife.	Allude.	Gloat.
Burlington.	Cup.	Fern.	Tooth.	Buff.	
Java.	Rauche.	Hidden.	Six.	Astral.	Giving
London.	Cup.	Festive.	Trade.	Box.	
Danube.	Rations.	Petrel.	Sky.	Abide.	Glance.
Boston.	Cup.	Feline.	Traduce.	Box.	
Baltic.	Ready.	Earth.	England.	Absent.	Gloat.
Chicago.	Cup.	Fling.	Topaz.	Brash.	
Aral.	Rake.	Earth.	Smoke.	0	Gensing.
Milwaukee.	Cup.	Flue.	Tone.	Brief.	
Aral.	Rauche.	Earth.	Haze.	0	Gingham.
Escanaba.	Cup.	Flint.	Token.	Bridal.	
Caspian.	Daub.	Hidden.	Bug.	0	Gimp.
Breckenridge.	Cup.	Flurry.	Tinker.	Brute.	
Adam.	Raid.	Earth.	Sky.	0	Ghost.
Bismarck.	Cup.	Fiscal.	Tone.	Bluff.	
Mabel.	Damage.	Earth.	Haze.	0	Gingham.
Duluth.	Cup.	Flute.	Tonic.	Bluff.	
Beech.	Race.	Earth.	Sky.	0	Gingham.
Pembina.	Cup.	Flesh.	Toddy.	Breathe.	
Andrew.	Rauche.	Neptune.	Ant.	0	Giddy.
Francisco.	Cup.	Firewood.	Towel.	Brown.	
Italy.	Raid.	Hidden.	Bug.	0	Gladly.
Oregon.	Cup.	Flue.	Topaz.	Budge.	
Cedar.	Race.	Hidden.	Fog.	0	Gipsy.
Salt.	Cup.	Flinching.	Town.	Benzine.	
Beech.	Race.	Earth.	Sky.	0	Glass.
Cheyenne.	Cup.	Focus.	Toddy.	Better.	
Danube.	Rauche.	Earth.	Sky.	0	Gig.
Denver.	Cup.	Told.	Topaz.	Bengal.	
Cowper.	Daisy.	Earth.	Sky.	0	Gensing.
Pikes.	Cup.	Forest.	Tiger.	Beadle.	
Eliza.	Deaf.	Earth.	Sky.	0	General.
Santa.	Cup.	Flagrant.	Total.	Bat.	
Flora.	Damp.	Horse.	Haze.	0	Gird.

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Sangeen.	Cup.	Finger.	Tone.	Brief.	
Anna.	Rapping.	Hidden.	Six.	Abyss.	Gensing.
Stanley.	Cup.	Finder.	Topaz.	Brief.	
Baltic.	Rapping.	Nickel.	Sky.	Abed.	Gingham.
Dover.	Cup.	Film.	Topeka.	Boyle.	
Baltic.	Rations.	Silver.	Sky.	0	
Toronto.	Cup.	Filbert.	Tonic.	Brad.	
Caspian.	Decide.	Grouse.	Yellow.	0	Gingham.
Kingston.	Cup.	Fiddle.	Topic.	Bird.	
Caspian.	Data.	Hidden.	Wales.	Adieu.	Give.
Ottawa.	Cup.	Fetid.	Tooth.	Bread.	
Garden.	Data.	Hidden.	Sky.	0	Giving.
Montreal.	Cup.	Fern.	Torpid.	Buff.	
Lomond.	Debar.	Hidden.	Six.	Amen.	Give.
Quebec.	Cup.	Fault.	Toulon.	By.	
Clara.	Dice.	Hidden.	Six.	Actor.	
Father.	Cup.	Feeble.	Topeka.	Brunt.	
Maud.	Rapid.	Hidden.	Haze.	Abase.	
Rosier.	Cup.	Few.	Touch.	By.	
Potomac.	Raft.	Hidden.	Fog.	Abyss.	Girl.
Chatham.	Cup.	Forum.	Trammel.	By.	
Maud.	Ralph.	Hidden.	Hub.	Affix.	Globe.
Sydney.	Cup.	Fig.	Trash.	Burst.	
Grant.	Deceit.	Hidden.	Hay.	Abed.	Gloat.
Halifax.	Cup.	Fete.	Traitor.	Brunt.	
Bacon.	Rapping.	Hidden.	Hay.	Approve.	Gloom.
Marquette.	Cup.	Flinching.	Tonic.	Brash.	
Caspian.	Rank.	Hidden.	France.	0	Gipsy.

WASHINGTON AND CINCINNATI.

Pittsburgh.	Cup.	Financial.	Total.	Brad.	
Anna.	Ranche.	Hidden.	Bug.	Abed.	Giving.
Cincinnati.	Cup.	Fledge.	Touch.	Bless.	
Agnes.	Ralph.	Earth.	Sky.	0	Giving.
Indianapolis.	Cup.	Fleet.	Torpid.	Brave.	
Beech.	Race.	Earth.	Smoke.	0	Gird.
Saint.	Cup.	Flown.	Towel.	Bow.	
Agnes.	Raft.	Earth.	Smoke.	0	Gladly.
Gibson.	Cup.	Floss.	Towel.	Breathe.	
Mabel.	Raft.	Earth.	Sky.	0	Gladden.
Cairo.	Cup.	Flinching.	Traduce.	Brew.	
Agnes.	Data.	Earth.	Sky.	0	Gloat.
Leavenworth.	Cup.	Flurry.	Toulon.	Bread.	
Beech.	Race.	Earth.	Sky.	0	Gladden.
Keokuk.	Cup.	Flown.	Toulon.	Brain.	
Beech.	Race.	Earth.	Sky.	0	Giving.
Shreveport.	Cup.	Flock.	Traffic.	Brew.	
Assist.	Damp.	Hidden.	Fog.	0	Gloat.
Vicksburg.	Cup.	Fold.	Traffic.	Brown.	
Beech.	Race.	Mars.	Smoke.	0	
Memphis.	Cup.	Flinching.	Tragic.	Brew.	
Aral.	Raid.	Earth.	Sky.	0	Gloom.
Nashville.	Cup.	Fleet.	Traduce.	Brew.	
Beech.	Race.	Earth.	Smoke.	0	Gladly.
Louisville.	Cup.	Fledge.	Town.	Bowl.	
Cherry.	Race.	Earth.	Fog.	0	Glass.
Platte.	Cup.	Finch.	Toulon.	Brain.	
Adam.	Raid.	Earth.	Sky.	0	Glad.
Omaha.	Cup.	Focus.	Topaz.	Brief.	
Beech.	Race.	Earth.	Smoke.	0	Gensing.
Davenport.	Cup.	Focal.	Tone.	Bride.	
Agnes.	Rapping.	Earth.	Smoke.	0	Gensing.
Paul.	Cup.	Flute.	Toga.	Buchu.	
Beech.	Race.	Earth.	Haze.	0	Giggle.
Yankton.	Cup.	Food.	Tithe.	Brim.	
Eliza.	Rack.	Earth.	Sky.	0	Giggle.
LaCrosse.	Cup.	Foist.	Tomb.	Bride.	
Dublin.	Daisy.	Hidden.	Fog.	0	Gin.

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SIGNAL LINE.

Branch.	Cup.	Fiasco.	Traduce.	Brash.	Light.
China.	Rebut.	Earth.	Sky.	Abide.	SE. Gladly.
Hook.	Cup.	Fickle.	Trace.	Brain.	Heavy.
Huron.	Depth.	Earth.	Blue.	0	East. Gladly.
Squan.	Cup.	Fife.	Trace.	Bowl.	Heavy.
Danube.	Decide.	Earth.	Sky.	Abed.	S. E. Gladden.
Barnegat.	Cup.	Fidget.	Traduce.	Body.	Heavy.
Danube.	Reach.	Earth.	Haze.	Act.	East. Blank.
Atlantic.	Cup.	Figment.	Traduce.	Brash.	Heavy. Glass.
Huron.	Raven.	Petrel.	Sky.	0	East.
Peck's.	Cup.	Filed.	Traduce.	Brandish.	Heavy.
Huron.	Ready.	Lark.	Ant.	0	S. E. Glance.
Henry.	Cup.	Filial.	Trammel.	Book.	Light.
Danube.	Debate.	Earth.	Sky.	0	North. Glass.

PAPER 13.—FORM 2.

WAR DEPARTMENT, SIGNAL-SERVICE, UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE.

Telegraphic report of observations received at Washington, D. C., on September 30, 1874, *at* 5 *p. m.*

NEW YORK AND SAVANNAH.

Savannah.	Gust.	Flail.	Trick.	Beat.	
China.	Dance.	Earth.	Sky.	0	
Lake.	Gust.	Flat.	Trim.	Belfast.	
Aral.	Damage.	Earth.	Sky.	0	
Jacksonville.	Gust.	Flat.	Trim.	Betel.	
China.	Damp.	Earth.	Sky.	0	
Rassa.	Gust.	Fleet.	Trick.	Bluff.	
Huron.	Data.	Magpie.	Haze.	0	
Charleston.	Gust.	Fixing.	Tribune.	Benzine.	
China.	Rally.	Earth.	Sky.	0	
Augusta.	Gust.	Flagrant.	Trifle.	Betel.	
China.	Rally.	Earth.	Sky.	0	
Montgomery.	Gust.	Flap.	Truant.	Beak.	
Danube.	Rank.	Earth.	Sky.	0	
Orleans.	Gust.	Flock.	Trim.	Belfast.	Rid.
Aral.	Dark.	Neptune.	Smoke.	0	Habit.
Mobile.	Gust.	Flesh.	Trifle.	Bless.	
Cowper.	Daub.	Earth.	Sky.	0	
Wilmington.	Gust.	Firewood.	Tribune.	Beard.	
Danube.	Rapping.	Earth.	Sky.	0	
Norfolk.	Gust.	Finder.	Treble.	Beat.	
Baltic.	Deceit.	Petrel.	Sky.	0	
Washington.	Gust.	Finely.	Traffic.	Bilge.	
Baltic.	Decrease.	Earth.	Turkey.	0	
Galveston.	Gust.	Flue.	Tribe.	Blithe.	
Grace.	Dan.	Solar.	Trunk.	0	
Indianola.	Gust.	Foal.	Trifle.	Bind.	
Flora.	Damp.	Calf.	Aut.	0	
Corsicana.	Gust.	Flue.	Trot.	Beast.	
Dickens.	Rally.	Earth.	Tick.	0.	
Knoxville.	Gust.	Fixing.	Trepan.	Beauty.	
Aral.	Rattle.	Mica.	Sky.	0	
Lynchburg.	Gust.	Finger.	Transit.	Beale.	
Aral.	Deaf.	Earth.	Sky.	0	
Baltimore.	Gust.	Final.	Traduce.	Book.	
Java.	Deaf.	Comet.	Spain.	Abide.	
Philadelphia.	Gust.	File.	Trace.	Bloom.	
Caspian.	Decide.	Hidden.	Brown.	Abase.	
May.	Gust.	Filed.	Tragic.	Blight.	
Baltic.	Rebuke.	Quail.	Sky.	0	
York.	Gust.	Fifth.	Traduce.	Blot.	
Caspian.	Rank.	Wolf.	Sky.	0	
Eastport.	Gust.	Felix.	Trace.	Breathe.	
Italy.	Reach.	Wolf.	Sky.	Abed.	
Portland.	Gust.	Fenian.	Tragic.	Bilge.	
Huron.	Rattle.	Petrel.	Sky.	0	

Digitized by Google

Boston.	Gust.	Fetid.	Traitor.	Bloom.
Caspian.	Rank.	Pigeon.	Yellow.	0
Burlington.	Gust.	Feudal.	Torpid.	Brim.
Java.	Rally.	Hidden.	Spain.	Acute.
London.	Gust.	Fibs.	Tragic.	Bluff.
Baltic.	Deadly.	Petrel.	Sky.	0
Mount.	Gust.	Fertile.	Tiger.	By.
Caspian.	Ductile.	Hidden.	Fog.	Admit.
Albany.	Gust.	Feudal.	Total.	Bray.
Como.	Deem.	Pigeon.	Yellow.	Aflix.
Oswego.	Gust.	Fight	Tooth.	Book.
Java.	Rattle.	Hidden.	Spain.	Ache.
Rochester.	Gust.	Filch.	Torpid.	Bloom.
Caspian.	Debris.	Silver.	Sky.	Act.
Buffalo.	Gust.	Final.	Topic.	Boyle.
Caspian.	Rapping.	Hidden.	Wales.	Abide.
Erie.	Gust.	Finely.	Touch.	Brad.
Como.	Rebuke.	Earth.	Wales.	Abed.
Cleveland.	Gust.	Finish.	Town.	Blithe.
Caspian.	Rattle.	Silver.	Sky.	0
Toledo.	Gust.	Fixing.	Trade.	Belfast.
Agnes.	Rat.	Pear.	Sky.	0
Detroit.	Gust.	Fishing.	Towel.	Bengal.
Baltic.	Deal.	Plum.	Sky.	0
Haven.	Gust.	Fledge.	Touch.	Bless.
Aral.	Rapping.	Peach.	Sky.	0
Huron.	Gust.	Fit.	Total.	Bison.
Caspian.	Rattle.	Silver.	Sky.	0
Alpena	Gust.	Fixing.	Topeka.	Body.
Caspian.	Deceit.	Nickel.	Turkey.	0
Milwaukee.	Gust.	Fleet.	Trade.	Bold.
Adam.	Deacon.	Earth.	Sky.	0
Breckenridge.	Gust.	Finger.	Trifle.	Beadle.
Dickens.	Rat.	Petrel.	Sky.	0
Bismarck.	Gust.	Fiddle.	Truth.	Bauble.
China.	Rake.	Earth.	Haze.	0
Garry.	Gust.	Final.	Trench.	Bluff.
Caspian.	Damp.	Nickel.	Spain.	0
Pembina.	Gust.	Figurehead.	Trip.	Botch.
Andrew.	Ready.	Dish.	Sky.	0
Duluth.	Gust.	Fixing.	Travel.	Beat.
China.	Ranch.	Grouse.	Sky.	0
Marquette.	Gust.	Fled.	Tooth.	Botch.
Amy.	Data.	Mica.	Sky.	0
Escanaba.	Gust.	Flap.	Total.	Blown.
Agnes.	Deceit.	Earth.	Sky.	0
Chicago.	Gust.	Fled.	Trade.	Bloom.
Mabel.	Rake.	Earth.	Sky.	0
Salt.	Gust.	Flesh.	Trip.	Baby.
Aral.	Rapping.	Saturn.	Sky.	0
Francisco.	Gust.	Fitful.	Traitor.	Brash.
Geneva.	Ready.	Planet.	Sk .	0
Diego.	Gust.	Fled.	Trench.	Bow.
Geneva.	Deaf.	Pants.	Yellow.	0
Diego.	Cup.	Flail.	Transit.	Brunt.
Grant.	Raid.	Hidden.	Bug.	0 Glow.
Oregon.	Gust.	Flax.	Trench.	Bled.
Agnes.	Raid.	Mars.	Sky.	0
Cheyenne.	Gust.	Florid.	Triplet.	Balsam.
Adam.	Raid.	Neptune.	Sky.	0
Denver.	Gust.	Florid.	Trot.	Banish.
Mary.	Damp.	Magpie.	Ant.	0
Pikes.	Gust.	Forbid.	Tipton.	Beak.
Amy.	Raft.	Earth.	Bug.	0
Santa.	Gust	Finland.	Trend.	Banish.
Huron.	Rally.	Horse.	Haze.	0
Saugeen.	Gust.	Finland.	Tonic.	Bowl.
Anna.	Rapping.	Hidden.	Six.	Abbot.
Stanley.	Gust.	Fishing.	Topaz.	Brief.
Java.	Debate.	Hidden.	Spain.	Acid.
Dover.	Gust.	Finish.	Torpid.	Bloom.

Digitized by Google

Baltic.	Rations.	Silver.	Sky.	0	
Kingston.	Gust.	Figurehead.	Topaz.	Brake.	
Jordan.	Damp.	Hidden.	White.	Abide.	
Toronto.	Gust.	Find.	Topic.	Blithe.	
Caspian.	Debris.	Hidden.	Spain.	0	
Ottawa.	Gust.	France.	Topeka.	Bilge.	
Caspian.	Deaf.	Hidden.	Spain.	0	
Montreal.	Gust.	Fetid.	Tonic.	Brunt.	
Java.	Debris.	Hidden.	Red.	Afraid.	
Quebec.	Gust.	Fay.	Topic.	Bray.	
Milan.	Devote.	Hidden.	Horn.	Allude.	
Father.	Gust.	Fashion.	Total.	Buff.	
Jordan.	Dance.	Calf.	Haze.	Adult.	
Chatham.	Gust.	Feast.	Trailing.	Build.	
Grant.	Death.	Hidden.	Clover.	Abbot.	
Sydney.	Gust.	Fear.	Trash.	Build.	
Grant.	Deaf.	Hidden.	Hay.	Ache.	
Halifax.	Gust.	Festa.	Traduce.	Bride.	
Italy.	Rapping.	Hidden.	Horn.	Abase.	

WASHINGTON AND CINCINNATI.

Pittsburgh.	Gust.	Firewood.	Touch.	Bluff.	River.
Caspian.	Deceit.	Hidden.	Wales.	Adult.	Helm.
Cincinnati.	Gust.	Flax.	Trammel.	Beat.	River.
Agnes.	Deaf.	Earth.	Sky.	0	Legend.
Indianapolis.	Gust.	Flat.	Transit.	Beaver.	
Aral.	Deaf.	Earth.	Sky.	0	
Saint.	Gust.	Floss.	Tremor.	Bask.	Wander.
Agnes.	Rake.	Earth.	Sky.	0	Landing.
Keokuk.	Gust.	Flinching.	Treble.	Beast.	River.
Aral.	Damage.	Earth.	Haze.	0	Liberal.
Gibson.	Gust.	Flat.	True.	Boy.	
Danube.	Dance.	Earth.	Sky.	0	
Leavenworth.	Gust.	Fleet.	Tribe.	Beadle.	River.
Adam.	Dale.	Earth.	Sky.	0	Lager.
Dodge.	Gust.	Financial.	Trust.	Bathe.	
China.	Ranche.	Earth.	Sky.	0	
Dodge.	Nude.	Fillet.	Traitor.	Both.	
China.	Rack.	Earth.	Sky.	0	
Dodge.	Cup.	Find.	Town.	Brake.	
Cowper.	Rack.	Earth.	Sky.	0	Gladden.
Cairo.	Gust.	Flock.	Trial.	Baste.	River.
Aral.	Damp.	Earth.	Sky.	0	Hanger.
Shreveport.	Gust.	Flap.	True.	Bauble.	River.
Danube.	Ranche.	Earth.	Sky.	0	Huge.
Vicksburg.	Gust.	Flown.	Trophy.	Bench.	River.
China.	Ralph.	Mars.	Sky.	0	Honest.
Memphis.	Gust.	Flint.	Tribune.	Bind.	River.
Aral.	Ranche.	Neptune.	Sky.	0	Hoist.
Nashville.	Gust.	Fledge.	Trepid.	Bay.	Oath.
Agnes.	Dan.	Earth.	Sky.	0	Hold.
Louisville.	Gust.	Flap.	Tremor.	Beadle.	River.
Danube.	Death.	Earth.	Sky.	0	Hebe.
Dubuque.	Gust.	Fleet.	Tray.	Bay.	River.
Aral.	Rally.	Earth.	Sky.	0	Hoff.
Davenport.	Gust.	Flock.	Tray.	Beale.	River.
Aral.	Ranche.	Earth.	Sky.	0	Hiding.
Omaha.	Gust.	Flap.	Trench.	Benzine.	River.
Cowper.	Ranche.	Earth.	Sky.	0	Legend.
Platte.	Gust.	Feudal.	Trophy.	Balm.	
Adam.	Rank.	Earth.	Sky.	0	
La Crosse.	Gust.	Fledge.	Trash.	Baste.	River.
Baltic.	Raft.	Mars.	Haze.	0	Horn.
Paul.	Gust.	Flag.	Tray.	Belt.	River.
Cowper.	Ralph.	Earth.	Haze.	0	Hoard.
Yankton.	Gust.	Fishing.	Trip.	Beak.	Wafer.
Cowper.	Rattle.	Earth.	Sky.	0	Labor.

SIGNAL LINE.

Branch.	Gust.	Fidus.	Traduce.	Boyle.	Light.
Caspian.	Defeat.	Hidden.	White.	0	S. E.

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Hook.	Gust.	Findings.	Traduce.	Book.	Short.
Jordan.	Dexter.	Hidden.	White.	Abbot.	N. E.
Squan.	Gust.	Fig.	Town.	Bowl.	Light.
Jordan.	Data.	Pigeon.	Sky.	0	S. E.
Barnegat.	Gust.	Fielding.	Traduce.	Bloom.	Heavy.
Italy.	Rations.	Wolf.	Sky.	0	East.
Pecks.	Gust.	File.	Traduce.	Box.	Heavy.
Jordan.	Debris.	Lily.	Wasp.	0	S. E.
Atlantic.	Gust.	Filch.	Traffic.	Bloom.	Heavy.
Jordan.	Rapping.	Quail.	Sky.	0	East.

PAPER 14.—FORM 2.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE.

Telegraphic report of observations received at Washington, D. C., September 30, 1874, at 12 midnight.

NEW YORK AND SAVANNAH.

Savannah.	Nut.	Fledge.	Tray.	Book.
China.	Damp.	Earth.	Sky.	0
Rassa.	Nut.	Florid.	Trial.	Bowl.
Baltic.	Dance.	Solar.	Sky.	0
Lake.	Nut.	Fling.	Traitor.	Bride.
China.	Rack.	Earth.	Sky.	0
Jacksonville.	Nut.	Flinching.	Travel.	Brain.
China.	Raid.	Earth.	Sky.	0
Charleston.	Nut.	Flax.	Tremor.	Bread.
China.	Damp.	Earth.	Sky.	0
Augusta.	Nut.	Flat.	Transit.	Bride.
Beech.	Race.	Earth.	Sky.	0
Montgomery.	Nut.	Fleet.	Trench.	Brandish.
Beech.	Race.	Earth.	Sky.	0
Orleans.	Nut.	Floss.	Trepan.	Bow.
China.	Raft.	Earth.	Smoke.	0
Corsicana.	Nut.	Flue.	Trepid.	Blew.
Cowper.	Raid.	Earth.	Sky.	0
Indianola.	Nut.	Focal.	Trepid.	Brace.
Cherry.	Race.	Earth.	Bee.	0
Galveston.	Nut.	Flue.	Trepid.	Bow.
Ida.	Damage.	Earth.	Bug.	0
Mobile.	Nut.	Flint.	Treble.	Boyle.
China.	Raid.	Earth.	Sky.	0
Wilmington.	Nut.	Flagon.	Travel.	Book.
Geneva.	Raid.	Mica.	Sky.	0
Norfolk.	Nut.	Flail.	Traffic.	Bilge.
Amy.	Rapping.	Petrel.	Sky.	0
Washington.	Nut.	Fixing.	Touch.	Bow.
Danube.	Ranche.	Earth.	Sky.	0
Knoxville.	Nut.	Flesh.	Toulon.	Bring.
Beech.	Race.	Earth.	Sky.	0
Lynchburg.	Nut.	Flat.	Towel.	Blush.
Aral.	Dale.	Earth.	Sky.	0
Baltimore.	Nut.	Fishing.	Towel.	Bowl.
Jordan.	Data.	Hidden.	France.	0
Philadelphia.	Nut.	Finny.	Touch.	Bless.
Caspian.	Decrease.	Platina.	Bug.	0
May.	Nut.	Finland.	Town.	Body.
Caspian.	Ready.	Hidden.	France.	0
York.	Nut.	Final.	Total.	Bold.
Italy.	Data.	Hidden.	Trumpet.	0
Eastport.	Nut.	Fever.	Total.	Brad.
Danube.	Deacon.	Earth.	Sky.	0
Portland.	Nut.	Fever.	Torpid.	Brace.
Huron.	Dance.	Grouse.	Sky.	0
Burlington.	Nut.	Fidget.	Topeka.	Brace.
Jordan.	Rally.	Hidden.	France.	Adieu.
London.	Nut.	Fight.	Toulon.	Blush.
Baltic.	Ranche.	Pigeon.	Sky.	0

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Boston.	Nut.	Folding.	Touch.	Brad.
Caspian.	Ranche.	Silver.	Sky.	0
Albany.	Nut.	Fig.	Tonic.	Brief.
Caspian.	Rebuke.	Hidden.	White.	0
Oswego.	Nut.	Final.	Topic.	Book.
Baltic.	Rattle.	Earth.	Wales.	0
Rochester.	Nut.	Finder.	Topaz.	Blush.
Caspian.	Range.	Hidden.	France.	Abase.
Buffalo.	Nut.	Firkin.	Tonic.	Bowl.
Jordan.	Rattle.	Hidden.	France.	Abed.
Erie.	Nut.	Fitful.	Troth.	Book.
Java.	Deceit.	Hidden.	Spain.	Blank.
Toledo.	Nut.	Flax.	Total.	Blown.
Jordan.	Dale.	Iron.	Sky.	0
Cleveland.	Nut.	Firewood.	Towel.	Blight.
Jordan.	Deaf.	Silver.	Sky.	0
Detroit.	Nut.	Flake.	Topic.	Body.
Baltic.	Raid.	Pium.	Sky.	0
Chicago.	Nut.	Flat.	Touch.	Brad.
Cowper.	Rally.	Earth.	Sky.	0
Milwaukee.	Nut.	Fledge.	Torpid.	Brave.
China.	Damp.	Earth.	Sky.	0
Escanaba.	Nut.	Flagrant.	Toil.	Bridal.
Adam.	Daisy.	Cobalt.	Sky.	0
Marquette.	Nut.	Fitful.	Told.	Bride.
Dickens.	Damp.	Pigeon.	Sky.	0
Garry.	Nut.	Firkin.	Topic.	Brute.
Aral.	Rank.	Earth.	Sky.	0
Pembina.	Nut.	Finny.	Touch.	Brad.
Baltic.	Rattle.	Neptune.	One.	0
Breckenridge.	Nut.	Firewood.	Toulon.	Bread.
Huron.	Rage.	Pigeon.	Sky.	0
Duluth.	Nut.	Final.	Trade.	Betel.
Geneva.	Ranche.	Dog.	Bee.	0
Saugeen.	Nut.	Firkin.	Topic.	Brim.
Chloe.	Rank.	Hidden.	Six.	Abase.
Stanley.	Nut.	Flail.	Tonic.	Buff.
Java.	Raid.	Hidden.	Spain.	Abbot.
Dover.	Nut.	Flail.	Tomb.	Brandish.
Danube.	Ralph.	Earth.	Sky.	0
Toronto.	Nut.	Fiscal.	Told.	Brave.
Danube.	Rage.	Earth.	Sky.	0
Kingston.	Nut.	Financial.	Toil.	Boyle.
Mohawk.	Raid.	Grouse.	Sky.	0
Ottawa.	Nut.	Fight.	Topeka.	Box.
Como.	Deadly.	Gold.	Sky.	0
Montreal.	Nut.	Fickle.	Tonic.	Bring.
Jordan.	Debate.	Hidden.	Haze.	Abase.
Quebec.	Nut.	Fence.	Toil.	Bridal.
Italy.	Defy.	Hidden.	Horn.	Abase.
Father.	Nut.	Federal.	Tone.	Brunt.
Italy.	Debris.	Weasel.	Haze.	Abase.
Chatham.	Nut.	Fellow.	Town.	Brave.
Dickens.	Debar.	Shoe.	Barley.	0
Halifax.	Nut.	Fidget.	Trace.	Brim.
Japan.	Rank.	Earth.	Sky.	0
Haven.	Nut.	Fled.	Told.	Brandish.
Agnes.	Rally.	Earth.	Sky.	
Huron.	Nut.	Flail.	Tonic.	Bowl.
Danube.	Ralph.	Saturn.	Sky.	
Alpena.	Nut.	Flag.	Toddy.	Brew.
Danube.	Rally.	Earth.	Blue.	0
Francisco.	Nut.	Flagrant.	Trace.	Buff.
Italy.	Rapping.	Hidden.	Bug.	
Diego.	Nut.	Flinching.	Transit.	Bray.
Jordan.	Raid.	Hidden.	Bug.	0
Oregon.	Nut.	Flail.	Tragic.	Bridal.
Cherry.	Race.	Ursa.	Haze.	0
Salt.	Nut.	Flax.	Trammel.	Bathe.

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Eliza.	Rack.	Earth.	Sky.	0
Denver.	Nut.	Flown.	Tragic.	Beat.
Cowper.	Dance.	Petrel.	Sky.	0
Pike's.	Nut.	Forbid.	Tindall.	Brown.
Agnes.	Rally.	Earth.	Sky.	0
Santa.	Nut.	Fitful.	Towel.	Beaver.
Mabel.	Raid.	Earth.	Sky.	0
Cheyenne.	Nut.	Flue.	Trace.	Balsam.
Danube.	Raid.	Earth.	Sky.	0

WASHINGTON AND CINCINNATI.

Pittsburgh.	Nut.	Flagrant.	Total.	Book.
Caspian.	Rank.	Hidden.	Bug.	0
Cincinnati.	Nut.	Flock.	Town.	Bilge.
Eliza.	Data.	Earth.	Sky.	0
Indianapolis.	Nut.	Flesh.	Touch.	Brain.
Beech.	Race.	Earth.	Sky.	0
Saint.	Nut.	Florid.	Traitor.	Both.
Agnes.	Daisy.	Earth.	Sky.	0
Keokuk.	Nut.	Fled.	Trade.	Brew.
Beech.	Race.	Earth.	Sky.	0
Leavenworth.	Nut.	Flax.	Traduce.	Brash.
Beech.	Race.	Earth.	Sky.	0
Cairo.	Nut.	Flown.	Tragic.	Bridal.
Beech.	Race.	Earth.	Sky.	0
Vicksburg.	Nut.	Flurry.	Trend.	Brandish.
Beech.	Race.	Earth.	Sky.	0
Shreveport.	Nut.	Flat.	Tray.	Brief.
Beech.	Race.	Earth.	Sky.	0
Memphis.	Nut.	Floss.	Trammel.	Bray.
Beech.	Race.	Earth.	Sky.	0
Nashville.	Nut.	Florid.	Trade.	Brash.
Beech.	Race.	Earth.	Fog.	0
Louisville.	Nut.	Fling.	Trace.	Bold.
Beech.	Race.	Earth.	Sky.	0
Platte.	Nut.	Fibs.	Trammel.	Bevy.
Adam.	Rat.	Earth.	Sky.	0
Omaha.	Nut.	Flag.	Trailing.	Both.
Cowper.	Rally.	Earth.	Sky.	0
Davenport.	Nut.	Flesh.	Towel.	Bread.
Beech.	Race.	Earth.	Sky.	0
La Crosse.	Nut.	Flap.	Touch.	Bread.
Cowper.	Ranche.	Earth.	Sky.	0
Sully.	Nut.	Film.	Trench.	Bail.
Aral.	Rattle.	Earth.	Sky.	0
Yankton.	Nut.	Finny.	Tray.	Blame.
China.	Ranche.	Earth.	Sky.	0
Paul.	Nut.	Finger.	Town.	Bowl.
Dickens.	Raid.	Globe.	Haze.	0
Gibson.	Nut.	Fledge.	Traitor.	Brace.
Adam.	Rage.	Earth.	Sky.	0

SIGNAL LINE.

Branch.	Nut.	Filed.	Total.	Bread.	Light.
Caspian.	Decide.	Hidden.	White.	0	S. E.
Hook.	Nut.	Film.	Toulon.	Blown.	Short.
Caspian.	Depth.	Hidden.	Wales.	0	N. E.
Squan.	Nut.	Finch.	Tooth.	Botch.	Light.
Jordan.	Ranche.	Quail.	Sky.	0	S. E.
Barnegat.	Nut.	Filial.	Tooth.	Brave.	Heavy.
Italy.	Ready.	Hidden.	France.	0	E.
Peck's.	Nut.	Firewood.	Tooth.	Buff.	Light.
Jordan.	Rapping.	Jupiter.	Ant.	0	S. E.
Atlantic.	Nut.	Finger.	Total.	Book.	Short.
Jordan.	Rapping.	Quail.	Sky.	0	East.

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PAPER 15.—(Form 3 A.)

DAILY BULLETIN.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Meteorological record, Washington, September 30, 1874—7.35 a. m.

Observations taken at the same moment of time at all stations.

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	WIND. Direction.	Velocity, miles per hour.	Pressure, pounds per square foot.	Force reduced to Beaufort scale.	CLOUDS. Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.	Rain-fall in last eight hours.	Change in river for last twenty-four hours + or −	State of weather.
Albany, N. Y.	29.39	.00	54		86	N. W.	3	.04	Gentle			4 S.	.35		Cloudy.
Alpena, Mich.	29.91	.08	41		82	N. W.	10	.50	Fresh			4 S.	.06		Cloudy.
Augusta, Ga.	30.04	.09	57		87	N. W.	3	.04	Gentle	0		0	0		Clear.
Baltimore, Md.	29.70	.09	57		69	W.	10	.50	Fresh	2 C.	W.	0	0		Fair.
Bismarck, Dak.	29.87	.03	44		60	E.	3	.04	Gentle	0	0	Haze.	0		Clear.
Boston, Mass.	29.25	.01	58		69	N. W.	23	.00	Brisk	0	0	2 S.	.06		Fair.
Breckenridge, Minn.	30.12	.01	31		89	S. E.	4	.08	Gentle	0	0	0	0		Clear.
Buffalo, N. Y.	29.63	.01	49		64	N. W.	20	2.00	Brisk			4 S.	.02		Cloudy.
Burlington, Vt.	29.37	.15	50		93	N. W.		.32	Fresh			4 N.	1.19		Light rain.
Cairo, Ill.	30.03	.05	58		81	N.		.32	Fresh	0	0	0	0		Clear.
Cape Rosier,	29.51	.14	52		100	W.		.02	Light			Fog.	.07		Heavy rain.
Cape May, N. J.	29.69	.13	60		70	W.	21	2.20	Brisk	0	0	0	.15		Clear.
Charleston, S. C.	30.01	.07	61		83	0	0	0	Calm	0	0	Fog.	0		Fair.
Chatham,	29.40	.25	63		100	E.		.24	Fresh			4 S.	.25		Cloudy.
Cheyenne, Wyo.	30.16	.00	38		45	W.		.32	Fresh	0	0	0	0		Clear.
Chicago, Ill.	30.04	.12	46		76	N. W.		.12	Gentle	0	0	Smoke.	0		Clear.
Cincinnati, Ohio.	30.00	.09	52		83	N.		.24	Fresh	0	0	0	0		Clear.
Cleveland, Ohio.	29.60	.13	52		93	N. W.	24	2.78	Brisk			4 S.	0		Cloudy.
Corsicana, Tex.	30.17	.05	58		75	W.	3	.04	Gentle	0	0	0	0		Clear.
Davenport, Iowa.	30.15	.11	44		82	N.	12	.72	Fresh	0	0	Smoke.	0		Clear.
Denver, Colo.	30.18	.02	46		43	S.	1	.01	Light	0	0	0	0		Clear.
Detroit, Mich.	29.87	.07	44		75	N. W.	12	.72	Fresh	0	0	0	0		Clear.
Duluth, Minn.	30.13	.06	45		60	0	0	0	Calm	0	0	0	0		Clear.
Eastport, Me.	29.24	.34	50		100	S.	22	2.42	Brisk			4 S.	.40		Cloudy.

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Erie, Pa	29.69	+.01	53	− 7	67	N. W.	18	1.62	Brisk			4 S.	.12		Cloudy.
Escanaba, Mich	30.05	+.07	41	− 6	82	N. W.	9	.40	Fresh			4 S.	0		Cloudy.
Father Point, Can	29.24	−.34	47	+ 1	88	E.	11	.60	Fresh			Hazy.	0		Cloudy.
Fort Gibson, C. N	30.08	+.06	54	− 4	80	E.	2	.02	Light	0	0	0	0		Clear.
Grand Haven, Mich	30.02	+.10	47	− 3	70	N. E.	11	.60	Fresh			4 S.	0		Cloudy.
Galveston, Tex	30.17	+.05	69	− 2	75	N. W.	10	.50	Fresh	1 Ci.	0	0	0		Fair.
Halifax, Nova Scotia	29.47	−.24	62	...	88	S. E.	12	.72	Fresh			4 N.	.92		Cloudy.
Havana, Cuba															
Indianapolis, Ind	30.01	+.09	49	− 2	77	0	0	0	Calm	0	0	Smoke.	0		Clear.
Indianola, Tex	30.19	+.04	69	− 2	90	N.	6	.18	Fresh	2 Ci.	0	1 S.	0		Fair.
Jacksonville, Fla	30.04	+.06	62	− 1	61	0	0	0	Calm	0	0	0	0		Clear.
Keokuk, Iowa	30.09	+.12	53	− 5	73	0	0	0	Calm	0	0	0	0		Clear.
Ottawa,	29.48	−.17	50	− 5	79	N. W.	8	.32	Fresh			0	0		Threatening.
Kingston, Canada	29.56	−.08	48	− 6	91	N. W.	8	.32	Fresh			4 S.	.16		Cloudy.
Knoxville, Tenn	30.61	+.02	51	− 4	86	S. W.	8	.32	Fresh	1 C.	W.	0	0		Clear.
La Crosse, Wis	30.17	+.08	43	− 2	83	S. W.	1	.01	Light			Fog.	0		Foggy.
Lake City, Fla	30.05	+.06	59	0	70	N. W.	3	.04	Gentle	0	0	0	0		Clear.
Leavenworth, Kans	30.12	+.12	53	− 1	79	0	0	0	Calm	0	0	0	0		Clear.
Louisville, Ky	30.00	+.09	55	− 4	68	0	0	0	Calm	0	0	Fog.	0		Fair.
Lynchburgh, Va	29.81	+.04	59	0	65	W.	2	.02	Light	0	0	0	0		Clear.
Marquette, Mich	30.03	+.03	45	− 2	76	N. W.	10	.50	Fresh			4 S.	0		Cloudy.
Memphis, Tenn	30.03	−.02	60	+ 6	81	N. W.	4	.08	Gentle	0	0	0	0		Clear.
Milwaukee, Wis	30.10	−.06	44	− 8	84	N. W.	8	.32	Fresh	0	0	Hazy.	0		Clear.
Mobile, Ala	30.14	+.08	57	0	69	N.	4	.08	Gentle	0	0	0	0		Clear.
Montgomery, Ala	30.13	+.08	55	− 1	72	N. W.	2	.02	Light	0	0	0	0		Clear.
Montreal, Canada	29.37	−.15	49	− 7	93	N. W.	19	1.80	Brisk			4 N.	.65		Heavy rain.
Nashville, Tenn	30.01	.00	58	+ 6	81	0	0	0	Calm	0	0	Smoke.	0		Clear.
New London, Conn	29.45	+.21	57	− 6	69	W.	15	1.12	Brisk	1 C.	W.	0	.04		Clear.
New Orleans, La	30.14	+.06	69	+ 4	61	N. E.	4	.08	Gentle	1 Ci.	0	Smoke.	0		Clear.
New York, N. Y	29.56	+.10	55	− 8	73	W.	16	1.28	Brisk	Hazy.	0	Smoke.	.04		Clear.
Norfolk, Va	29.72	−.04	57	− 9	75	W.	10	.50	Fresh	Hazy.	0	0	0		Clear.
North Platte, Neb	29.77	+.05	54	+10	79	S. E.	4	.08	Gentle	0	0	0	0		Clear.
Omaha, Nebr	30.16	+.10	46	− 7	84	0	0	0	Calm	0	0	Smoke.	0		Clear.
Oswego, N. Y	29.51	−.07	54	− 4	79	N. W.	16	1.28	Brisk			4 S.	0		Cloudy.
Pembina, Dak	30.02	+.01	38	+ 8	80	S. E.	8	.32	Fresh	1 Ci.	0	1 S.	0		Fair.
Philadelphia, Pa	29.65	+.15	57	− 4	87	N. W.				2 Ci.	S. W.	0	0		Fair.
Pike's Peak, Col. Ter	30.25	−.02	27	0	30	N. E.	12	.72	Fresh	0	0	0	0		Clear.
Pittsburgh, Pa	29.76	+.04	51	− 5	72	N.	8	.32	Fresh			4 S.	.63		Cloudy.
Port Dover, Canada	29.74	−.01	47	0	70	N. W.	15	1.12	Brisk	3 C.	N. W.	0	0		Fair.
Port Huron, Mich	29.84	.00	46	+ 2	69	N. W.	17	1.44	Brisk	2 C.	E.	0	0		Fair.
Port Stanley, Canada	29.79	−.01	46	− 2	84	N. W.	12	.72	Fresh	2 C.	N. W.	0	.03		Fair.
Portland, Me	29.65	−.25	60	− 1	94	S. W.	8	.32	Fresh			4 S.	.50		Threatening.
Portland, Oreg	30.10	+.02	46	− 5	92	0	0	0	Calm			Fog.	0		Foggy.
Punta Rassa, Fla	30.08	+.03	71	− 7	62	N.	10	.50	Fresh	4 Ci.	W.	0	0		Cloudy.
Quebec, Canada	29.08	−.49	53	− 3	100	N.	42	8.82	Gale			4 N.	.12		Heavy rain.
Rochester, N. Y	29.56	−.04	51	− 5	79	N. W.	18	1.62	Brisk			4 S.	.04		Threatening.
Salt Lake City, Utah	30.03	+.03	55	− 2	44	0	0	0	Calm	0	0	0	0		Clear.
San Francisco, Cal	29.85	+.01	54	− 1	87	S. W.	4	.08	Gentle			4 S.	0		Cloudy.
Santa Fe, N. Mex	29.93	+.01	51	− 3	92	N. E.	4	.08	Gentle	2 Ci.	S. W.	Hazy.	0		Fair.
Saugeen, Canada	29.81	+.10	44	− 2	84	N.	12	.72	Fresh			4 N.	.07		Cloudy.
Savannah, Ga	30.02	+.07	60	− 1	76	0	0	0	Calm	0	0	0	0		Clear.
Shreveport, La	30.06	+.07	59	− 3	81	N. W.	4	.08	Gentle			Fog.	0		Foggy.

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Meteorological record, Washington, September 30, 1874, 7.35 a. m.—Continued.

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	Wind.			Clouds.			Rain-fall in last eight hours.	Change in river for last twenty-four hours + or −	State of weather.
						Direction.	Velocity, miles per hour.	Pressure, pounds per square foot.	Force reduced to Beaufort scale.	Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.			
Saint Louis, Mo	30.09	+ .16	54	− 1	67	N.	2	.02	Light	0	0	Smoke.	0	.....	Clear.
Saint Paul, Minn	30.13	+ .08	39	− 8	90	0	0	0	Calm	0	0	Hazy.	0	.....	Clear.
Sydney, C. B	29.64	− .20	65	.....	94	S.	16	1.20	Brisk	.....	.....	4 N.	.03	.....	Cloudy.
Toledo, Ohio	29.92	+ .08	46	+ 3	61	N. W.	14	.92	Fresh	.....	0	0	0	.....	Clear.
Toronto, Canada	29.68	.00	45	+ 6	72	N. W.	17	1.44	Brisk	1 Ci.	W.	3 S.	0	.....	Cloudy.
Vicksburg, Miss	30.18	+ .05	59	+ 1	87	0	0	0	Calm	Hazy.	0	Smoke.	0	.....	Fair.
Washington, D. C	29.73	+ .06	57	+ 3	68	W.	8	.32	Fresh	1 Ci.	N.	Smoke.	0	.....	Fair.
Wilmington, N. C	29.96	+ .08	59	+ 3	64	N. W.	4	.08	Gentle	0	0	0	0	.....	Clear.
Yankton, Dak	30.21	+ .07	37	+ 4	85	N. E.	1	.01	Light	0	0	0	0	.....	Clear.

PUBLISHED BY ORDER OF THE WAR DEPARTMENT.

NOTE.—Barometer corrected for temperature and elevation. Reports are received over circuits arranged at the War Department with the Western Union, Atlantic and Pacific, Franklin, North Western, and Southern and Atlantic Telegraph Companies, and are furnished gratuitously to such newspapers as desire to publish them for the benefit of their readers.

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PAPER 16.—(Form 3 A.)

DAILY BULLETIN.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Meteorological record, Washington, September 30, 1874—4.35 p. m.

Observations taken at the same moment of time at all stations.

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	WIND.				CLOUDS.			Rain-fall in last eight hours.	Change in river for last twenty-four hours, + or −.	State of weather.
						Direction.	Velocity, miles per hour.	Pressure, pounds, per square foot.	Force reduced to Beaufort scale.	Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.			
Albany, N. Y.	29.49	+.10	51	+ 9	78	N. W.	22	2.42	Brisk	2 C.	W.	1 S.	.25	+ 2	Clearing.
Alpena, Mich.	29.91	.00	47	+ 3	62	N. W.	16	1.28	Brisk	4 C.	N. W.	0	0	.....	Cloudy.
Augusta, Ga.	29.93	.11	57	+ 3	46	S. W.	6	.18	Fresh	0	0	0	0	.....	Clear.
Baltimore, Md.	29.55	+.05	58	+ 4	64	S. W.	12	.72	Fresh	1 Ci.	0	3 N.	.04	.....	Light rain.
Bismarck, Dak.	29.56	+.31	39	+ 11	17	S. W.	5	.12	Gentle	0	0	Hazy.	0	.....	Clear.
Boston, Mass.	29.48	+.24	62	+ 1	57	N. W.	10	.50	Fresh	2 C.	W.	2 S.	0	.....	Cloudy.
Breckenridge, Minn.	29.81	+.31	42	+ 13	30	S.	14	.98	Fresh	1 C.	W.	0	0	.....	Clear.
Buffalo, N. Y.	29.75	+.12	47	14	70	N. W.	12	.72	Fresh	.....	.....	4 S.	.04	.....	Cloudy.
Burlington, Vt.	29.49	+.12	49	2	85	N. W.	6	.18	Fresh	.....	.....	4 N.	.13	.....	Light rain.
Cairo, Ill.	30.06	+.03	71	2	27	N. W.	4	.08	Gentle	0	0	0	0	+ 3	Clear.
Cape May, N. J.	29.71	+.02	60	5	56	N. W.	24	2.88	Brisk	3 C.	W.	0	0	.....	Fair.
Charleston, S. C.	29.91	.10	76	1	41	S. W.	6	.18	Fresh	0	0	0	0	.....	Clear.
Chatham, Can.	29.19	.....	61	8	94	S.	14	.98	Fresh	.....	.....	4 S.	.02	.....	Cloudy.
Cheyenne, Wyo. T.	30.07	.....	81	8	8	S. E.	4	.08	Gentle	1 Ci.	0	0	0	.....	Clear.
Chicago, Ill.	29.99	.05	57	5	57	E.	5	.12	Gentle	0	0	0	0	.....	Clear
Cincinnati, Ohio.	29.92	.02	63	9	36	N.	12	.72	Fresh	0	0	0	0	1	Clear.
Corsicana, Tex.	30.10	.07	72	0	35	S.	6	.18	Fresh	0	0	2 S.	0	.....	Fair.
Cleveland, Ohio.	29.83	.....	55	12	56	N. W.	16	1.28	Brisk	4 C.	N. W.	0	0	.....	Cloudy.
Davenport, Iowa.	30.06	.09	57	4	32	N. W.	8	.32	Fresh	0	0	0	0	9	Clear.
Denver, Colo.	30.07	.11	32	+ 1	75	E.	4	.08	Gentle	2 Ci.	W.	1 S.	0	.....	Fair.
Detroit, Mich.	29.87	+.01	54	13	43	N. W.	13	.84	Fresh	3 C.	N.	0	0	.....	Fair.
Dodge City, Kan.	29.76	+.02	38	+ 3	28	S. W.	8	.32	Fresh	0	0	0	0	.....	Clear.
Dubuque, Iowa.	30.01	.....	67	2	29	N. W.	6	.18	Fresh	0	0	0	0	.....	Fair.
Duluth, Minn.	28.91	.00	66	2	36	S. W.	8	.32	Fresh	1 Ci.	W.	0	0	.....	Clear.
Eastport, Me.	29.92	+.01	56	1	80	S. W.	18	1.62	Brisk	4 C.	S. W.	0	.03	.....	Cloudy.
Erie, Pa.	29.80	+.11	52	−13	72	N. W.	24	2.88	Brisk	0	0	4 S.	.03	.....	Cloudy.

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Meteorological record, Washington, September 30, 1874—4.35 p. m.—Continued.

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity. per cent.	WIND. Direction.	WIND. Velocity, miles, per hour.	WIND. Pressure, pounds, per square foot.	WIND. Force reduced to Beaufort scale.	CLOUDS. Amount of upper clouds.	CLOUDS. Upper clouds moving from the—	CLOUDS. Amount of lower clouds.	Rain-fall in last eight hours.	Change in river for last twenty-four hours, + or —.	State of weather.
Escanaba, Mich	29.96	.09	51		59	N.	16	1.28	Brisk	0	0	0	0	.....	Clear.
Father Point, Can	29.94	.30	51		93	W.	6	.18	Fresh	2 Ci.	S. W.	Hazy.	.32	.....	Fair.
Fort Garry, Manitoba	29.93	.00	70		80	N. W.	4	.08	Gentle	2 C.	N. W.	2 N.	0	.....	Cloudy.
Fort Gibson, Ind. T	29.97	.11	44		100	W.	6	.12	Fresh	0	0	0	0	.....	Clear.
Galveston, Tex	30.10	.07	75		67	N. E.	5	.12	Gentle	2 Ci.	N.	2 S.	0	.....	Cloudy.
Grand Haven, Mich	30.00	.02	52		83	N. W.	12	.72	Fresh	1 C.	.....	0	0	.....	Clear.
Halifax, Nova Scotia	29.93	.04	54		83	S. W.	12	.72	Fresh	.....	0	4 N.	.01	.....	Cloudy.
Indianapolis, Ind	29.97	.04	64		78	N. W.	12	.72	Fresh	0	S. W.	0	0	.....	Clear.
Indianola, Tex	30.14	.05	76		49	N. E.	7	.08	Gentle	2 C.	S. W.	1 S.	0	.....	Fair.
Jacksonville, Fla	29.97	.07	79		49	S. W.	4	.08	Gentle	0	0	0	0	.....	Clear.
Keokuk, Iowa	30.03	.06	69		46	S. W.	3	.04	Gentle	0	0	0	0	.....	Clear.
Kingston, Canada	29.97	.11	46		85	W.	4	.08	Gentle	.....	.....	4 S.	0	0	Cloudy.
Knoxville, Tenn	29.91	.10	72		74	N. W.	16	1.28	Brisk	1 C.	N. W.	0	0	.....	Clear.
La Crosse, Wis	30.00	.17	65		57	N. W.	2	.02	Light	Hazy.	0	Hazy.	0	0	Fair.
Lake City, Fla	29.97	.08	79		40		3	.04	Gentle	0	0	0	0	.....	Clear.
Leavenworth, Kans	30.01	.11	75		30	S. E.	2	.02	Light	0	0	0	0	— 1	Clear.
Louisville, Ky	29.99	.04	68		38	W.	14	.98	Fresh	0	0	0	0	0	Clear.
Lynchburg, Va	29.91	.00	64		32	N. W.	12	.72	Fresh	0	0	0	0	.....	Clear.
Marquette, Mich	29.95	.09	50		62	N.	8	.32	Fresh	0	0	0	0	.....	Clear.
Memphis, Tenn	30.05	.02	76		49	N. W.	8	.32	Fresh	0	N. W.	0	0	.....	Clear.
Milwaukee, Wis	30.01	.04	57		63	S. E.	10	.50	Fresh	0	0	0	0	+ 3	Clear.
Mobile, Ala	30.02	.12	78		63	S.	9	.40	Fresh	0	0	0	0	.....	Clear.
Montgomery, Ala	29.96	.17	74		31	W.	10	.50	Fresh	0	0	0	0	.....	Clear.
Montreal, Canada	29.84	.11	45		85	N. W.	30	2.00	Brisk	.....	.....	4 N.	.26	.....	Light rain.
Mount Washington, N. H	29.42		27		100	N. W.	84	35.28	Hurricane	.....	.....	Fog.	.18	.....	Cloudy.
Nashville, Tenn	30.00	.04	73		39	N.	6	.12	Gentle	0	0	0	0	+ 3	Clear.
New London, Conn	29.54	+ .09	60		80	N. W.	11	.60	Fresh	1 Ci.	W.	0	0	.....	Fair.
New Orleans, La	30.06	.04	79		40	N. W.	7	.24	Fresh	1 Ci.	0	Smoky.	0	— 3	Clear.
New York, N. Y	29.93	.05	68		56	N. W.	10	.50	Fresh	3 C.	S. W.	0	0	.....	Fair.
Norfolk, Va	29.79	.07	69		56	N. W.	16	1.28	Brisk	1 C.	W.	0	0	.....	Clear.
North Platte	29.49	.06	83		36	S. E.	10	.50	Fresh	0	0	0	0	.....	Clear.
Omaha, Neb	29.66	.08	70		91	E. W.	8	.32	Fresh	0	0	0	0	.....	Clear.
Oswego, N. Y	29.93	.14	60		94	N. W.	16	1.28	Brisk	.....	.....	4 N.	.08	.....	Light rain.
Ottawa, Canada	30.36	.04	47		94	N. W.	12	.72	Fresh	.....	.....	4 N.	0	.....	Cloudy.
Pembina, Dak	29.67	.35	40		65	S. E.	20	2.00	Brisk	2 Ci.	S. E.	0	0	.....	Fair.

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Philadelphia, Pa	29.70	−.05	56	− 6	57	N. W.	17	1.44	Brisk			4 S.	.01	Light rain.
Pike's Peak, Col. Ter	30.24	+.01	35	− 2	31	N.	2	.02	Light	0	0	3 S.	0	Fair.
Pittsburgh, Pa	29.85	+.09	52	− 13	60	N. W.	16	1.28	Brisk			4 S.	.22	Cloudy.
Port Dover, Canada	29.83	+.09	49	− 13	57	N. W.	15	1.12	Brisk	3 C.	N. W.	0	0	Fair.
Port Huron, Mich	29.89	+.05	51	− 11	50	N. W.	16	1.28	Brisk	4 C.	N. W.	0	0	Cloudy.
Port Stanley, Canada	29.78	+.09	46	− 18	84	N. W.	15	1.12	Brisk			4 N.	.09	Li. ht rain.
Portland, Me	29.33	+.28	60	0	48	W.	16	1.28	Brisk	1 C.	W.	0	0	Fair.
Portland, Oreg	29.98	.12	70	.....	52	N.	4	.08	Gentle	Hazy.	0	0	0	Clear.
Punta Rassa, Fla	30.01	.07	77	+ 1	60	W.	8	.32	Fresh	2 Ci.	W.	Hazy.	0	Fair.
Quebec, Canada	29.13	+.05	48	− 12	78	S. W.	36	6.48	High			4 N.	.50	Light rain.
Rochester, N. Y	29.69	+.13	49	− 8	57	N. W.	20	2.00	Brisk	4 C.	N. W.	0	.10	Cloudy.
Salt Lake City, Utah	30.02	.01	80	0	18	N. W.	12	.72	Fresh	1 C.	0	0	0	Clear.
San Diego, Cal	29.99	+.05	70	− 5	67	S. W.	12	.72	Fresh	1 C.	S.	2 S.	0	Fair.
San Francisco, Cal	29.90	+.05	62	+ 1	76	S. W.	20	2.00	Brisk	3 Ci.	0	0	0	Fair.
Santa Fé, N. Mex	29.84	.09	71	− 1	75	W.	6	.18	Fresh	2 Ci.	S. W.	Hazy.	0	Fair.
Saugeen, Canada	29.84	+.03	45	− 12	68	N.	12	.72	Fresh			4 N.	.02	Cloudy
Savannah, Ga	29.94	.08	77	+ 2	36	S. W.	6	.18	Fresh	0	0	0	0	Clear.
Shreveport, La	29.96	−.10	85	− 6	17	W.	8	.32	Fresh	0	0	0	0	Clear.
Saint Louis, Mo	30.08	.01	68	9	26	N.	5	.12	Gentle	0	0	0	0	Clear.
Saint Paul, Minn	29.92	.21	67	+ 3	41	S.	7	.24	Fresh	0	0	0	0	Clear.
Sydney, C. B	29.17	.47	65	+ 4	94	S.	12	.72	Fresh			4 N.	.08	Cloudy.
Toledo, Ohio	29.91	−.01	57	− 11	40	N.	14	.98	Fresh	2 C.	N.	0	0	Fair.
Toronto, Canada	29.78	+.10	48	− 14	56	N. W.	20	2.00	Brisk			4 N.		Cloudy.
Vicksburg, Miss. o	30.09	.09	83	+ 8	42	S. W.	7	.24	Fresh	Hazy.	0	0	0	Clear.
Washington, D. C	29.80	.07	59	0	48	N. W.	18	1.62	Brisk	0	0	2 S.	0	Fair.
Wilmington, N. C	29.85	.11	76	+ 6	34	W.	12	.72	Fresh	0	0	0	0	Clear.
Yankton, Dak	29.78	.33	80	+ 4	31	S.	16	1.28	Brisk	0	0	0	0	Clear.

PUBLISHED BY ORDER OF THE WAR DEPARTMENT.

NOTE.—Barometer corrected for temperature and elevation. Reports are received over circuits arranged at the War Department with the Western Union, Atlantic and Pacific, Franklin, North Western, and Southern and Atlantic Telegraph Companies, and are furnished gratuitously to such newspapers as desire to publish them for the benefit of their readers.

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PAPER 17.—(Form 3, A.)

DAILY BULLETIN.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Meteorological record, Washington, September 30, 1874—11 p. m.

(Observations taken at the same moment of time at all stations.)

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	WIND. Direction.	Velocity, miles per hour.	Pressure, pounds per square foot.	Force reduced to Beaufort scale.	CLOUDS. Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.	Rain-fall in last eight hours.	Change in river for last twenty-four hours, + or —.	State of weather.
Albany, N. Y	29.64	—.15	45	—9	84	N. W.	24	2.88	Brisk	.....	.....	4 S.	0	.....	Cloudy.
Alpena, Mich	29.92	+.01	38	+5	81	W.	6	.18	Fresh	0	0	2 S.	0	.....	Fair.
Augusta, Ga	29.97	+.04	61	+3	83	0	0	0	Calm	0	0	0	0	.....	Clear.
Baltimore, Md	29.88	+.13	54	+5	86	W.	8	.32	Fresh	.....	.....	4 S.	0	.....	Cloudy.
Boston, Mass	29.59	+.11	52	+10	72	N. W.	24	2.88	Fresh	1 C.	N. W.	0	0	.....	Cloudy.
Breckenridge, Minn	29.76	+1.05	53	+9	79	W.	3	.04	Gentle	2 C.	W.	0	0	.....	Fair.
Buffalo, N. Y	29.76	+.11	45	+9	68	W.	16	1.28	Brisk	.....	.....	4 S.	.03	.....	Cloudy.
Burlington, Vt	29.57	+.08	47	+7	77	W.	6	.18	Fresh	.....	.....	4 S.	.16	.....	Cloudy.
Cairo, Ill	30.09	+.03	60	+2	82	0	0	0	Calm	0	0	0	0	.....	Clear.
Cape May, N. J	29.74	+.13	55	+5	82	N. W.	20	2.00	Brisk	.....	.....	4 S.	0	.....	Cloudy.
Charleston, S. C	29.98	+.07	68	+1	79	S. W.	4	.08	Gentle	0	0	0	0	.....	Clear.
Chatham, Can	29.39	+.10	55	+8	77	S.	19	1.80	Brisk	2 C.	S.	1 S.	0	.....	Fair.
Cheyenne, Wyo	30.10	+.03	56	—1	81	W.	4	.08	Gentle	0	0	0	0	.....	Clear.
Chicago, Ill	29.97	+.02	52	+2	82	S.	6	.18	Fresh	0	0	0	0	.....	Clear.
Cincinnati, Ohio	30.06	—.08	55	+2	82	N. E.	8	.32	Fresh	0	0	0	0	.....	Clear.
Cleveland, Ohio	29.95	+.02	54	—7	85	W.	12	.72	Fresh	4 C.	N. W.	0	0	.....	Cloudy.
Corsicana, Tex	30.10	—.60	73	—15	54	S.	4	.08	Gentle	0	0	0	0	.....	Clear.
Davenport, Iowa	30.02	—.04	54	—1	79	0	0	0	Calm	0	0	0	0	.....	Clear.
Denver, Colo	30.09	+.02	60	—3	41	S.	6	.18	Fresh	1 C.	W.	0	0	.....	Clear.
Detroit, Mich	29.95	—.07	48	—5	82	N. W.	4	.08	Gentle	3 C.	N.	0	0	.....	Fair.
Duluth, Minn	29.75	+.16	37	—7	86	S. W.	8	.32	Fresh	Hazy.	S. W.	2 S.	0	.....	Fair.
Eastport, Me	29.50	+.22	51	—7	86	W.	10	.50	Fresh	0	0	0	0	.....	Clear.
Erie, Pa	29.90	+.10	50	—11	64	N. W.	16	1.28	Brisk	.....	.....	4 N.	0	.....	Light rain.
Escanaba, Mich	29.94	+.03	40	—2	82	S. E.	1	.01	Light	1 Cl.	N. W.	0	.....	.....	Clear.
Father Point, Can	29.23	+.29	44	—5	88	S. W.	20	2.00	Brisk	4 C.	S. W.	Hazy.	.01	.....	Cloudy.

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Fort Garry, Manitoba	29.86	+ 11	48	+ 4	89	N. W.	10	.50	Fresh	0	0	0	0		Clear.
Fort Gibson, Ind. Ter	30.00	+.03	62	+ 1	71	S. E.	3	.04	Gentle	0	0	0	0		Clear.
Fort Sully, Dak	29.74		70	+ 7	20	N. W.	16	1.28	Brisk	0	0	0	0		Clear.
Galveston, Tex	29.99	−.01	42	−14	75	N.	7	.24	Fresh	0	0	0	0		Clear.
Grand Haven, Mich	30.10	.00	73	+ 2	67	N. E.	3	.04	Gentle	0	0	4 S.	0		Cloudy.
Halifax, Nova Scotia	29.57	+.14	56	− 3	85	S. W.	10	.50	Fresh	0	0	1 S.	0		Clearing.
Indianapolis, Ind	30.02	+.05	52	− 6	73	0	0	0	Calm	0	0	0	0		Clear.
Indianola, Tex	30.15	+.01	73	0	71	0	0	0	Calm	0	0	2 S.	0		Fair.
Jacksonville, Fla	30.03		66	+ 2	73	S. W.	4	.08	Gentle	0	0	0	0		Clear.
Keokuk, Iowa	29.99	−.04	57	− 4	81	0	0	0	Calm	0	0	0	0		Clear.
Kingston, Canada	29.76	+.09	40	−13	70	W.	4	.08	Gentle	1 Ci.	W.	0	0		Fair.
Knoxville, Tenn	30.02	+.11	53	0	86	0	0	0	Calm	0	0	0	0		Clear.
La Crosse, Wis	29.96	+.04	52	0	79	S.	8	.32	Fresh	0	0	0	0		Clear.
Lake City, Fla	30.04	+.07	62	+ 1	83	S. W.	1	.01	Light	0	0	0	0		Clear.
Louisville, Ky	30.04	+.08	56	− 6	63	0	0	0	Calm	0	0	0	0		Clear.
Lynchburg, Va	29.97	+.16	54	− 1	61	N. W.	2	.02	Light	0	0	0	0		Clear.
Marquette, Mich	29.90	−.09	42	− 5	83	S.	4	.08	Gentle	2 C.	W.	0	0		Fair.
Memphis, Tenn	30.08	+.03	63	0	78	0	0	0	Calm	0	0	0	0		Clear.
Milwaukee, Wis	30.00	−.01	49	− 5	77	S. W.	4	.08	Gentle	0	0	0	0		Clear.
Mobile, Ala	30.05	+.03	69	+ 7	70	S. W.	4	.08	Gentle	0	0	0	0		Clear.
Montgomery, Ala	30.01		70	+ 7	75	0	0	0	Calm	0	0	0	0		Clear.
Montreal, Canada	29.55	+.07	45	−11	86	W.	24	2.88	Brisk			Hazy	.01		Cloudy.
Nashville, Tenn	30.07	+.07	57	− 2	76	0	0	0	Calm	0	0	0	0		Clear.
New London, Conn	29.65	+.11	53	−11	61	N. W.	8	.32	Fresh	2 C.	W.	0	0		Fair.
New Orleans, La	30.08	+.02	72	+ 2	67	S. W.	2	.02	Light	0	0	Smoke.	0		Clear.
New York, N. Y	29.75	+.12	51	− 7	63	S. W.	8	.32	Fresh			4 S.	0		Cloudy.
Norfolk, Va	29.94	+.15	59	− 1	48	N.	12	.72	Fresh	1 C.	W.	0	0		Fair.
North Platte, Nebr	29.54		63		47	S. E.	14	.98	Fresh	0	0	0	0		Clear.
Omaha, Nebr	29.92	−.04	61	+ 4	66	S.	6	.18	Fresh	0	0	0	0		Clear.
Oswego, N. Y	29.75	+.10	48	−10	64	N. W.	16	1.28	Brisk	0	0	4 S.	0		Fair.
Ottawa, Canada	29.65	−.17	47	− 6	69	N. W.	11	.60	Fresh	2 Ci.	N. W.	0	0		Fair.
Pembina, Dak	29.82	+.15	52	+10	72	S. W.	16	1.28	Brisk	1 Ci.	0	1 S.	0		Fair.
Philadelphia, Pa	29.82	+.12	52	− 7	53	N. W.	18	1.62	Brisk	1 Ci.	N. W.	3 S.	0		Cloudy.
Pike's Peak, Col. Ter	30.24	.00	29	0	87	N.	6	.18	Fresh	0	0	0	0		Clear.
Pittsburgh, Pa	29.93	+.08	51	− 2	64	N. W.	10	.50	Fresh	0	0	0	0		Clear.
Port Dover, Canada	29.94	+.11	43	−10	75	W.	7	.24	Fresh	0	0	0	0		Clear.
Port Huron, Mich	29.94	+.05	45	− 7	68	W.	8	.32	Fresh	0	0	0	0		Clear.
Portland, Me	29.50	+.17	49	−10	71	W.	6	.18	Fresh	1 Ci.	W.	0	0		Fair.
Portland, Oreg	29.94	−.04	60	+ 3	82	0	0	0	Calm	2 C.	0	Hazy	0		Fair.
Port Stanley, Canada	29.94	+.06	45	− 6	93	N. W.	4	.08	Gentle			4 N.	.02		Light rain.
Punta Rassa, Fla	30.07	+.06	74	+ 3	68	N. W.	6	.18	Fresh	2 Ci.	0	0	0		Fair.
Quebec, Canada	29.32	+.19	40	−15	82	S. W.						4 N.	.01		Cloudy.
Rochester, N. Y	29.79	+.10	46	− 8	61	N. W.	9	.40	Fresh			4 S.	.01		Cloudy.
Salt Lake City, Utah	29.98	−.04	63	− 3	28	N. E.	1	.01	Light	0	0	0	0		Clear.
San Diego, Cal	30.03	+.06	64	− 2	78	W.	4	.08	Gentle			4 S	0		Cloudy.
San Francisco, Cal	29.93	+.03	56	+ 1	93	S. W.	12	.72	Fresh			4 S.	0		Cloudy.
Santa Fé, N. Mex	29.90	+.06	54	− 1	38	E.	4	.08	Gentle	0	0	0	0		Clear.
Santiago de Cuba															
Saugeen, Canada	29.86	+.02	48	− 1	85	N.	10	.50	Fresh			4 N.	.01		Light rain.
Savannah, Ga	30.00	+.06	67	+ 3	64	S. W.	4	.08	Gentle	0	0	0	0		Clear.

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Meteorological record, Washington, September 30, 1874—11 p. m.—Continued.

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	WIND.				CLOUDS.			Rain-fall in last eight hours.	Change in river for last twenty four hours, + or —.	State of weather.
						Direction.	Velocity, miles per hour.	Pressure, pounds per square foot.	Force reduced to Beaufort scale.	Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.			
Shreveport, La	29.97	+.01	67	+ 3	84	0	0	0	Calm	0	0	0	0	.....	Clear.
Saint Louis, Mo	30.07	—.01	62	— 3	66	N.	1	.01	Light	0	0	0	0	.....	Clear.
Saint Paul, Minn	29.81	—.11	55	+ 5	68	S.	4	.08	Gentle	2 Ci.	0	Haze..	0	.....	Fair.
Toledo, Ohio	29.98	+.07	51	— 3	59	W.	2	.02	Light	4 Ci.	N. W.	0	0	.....	Cloudy.
Toronto, Canada	29.87	+.09	42	— 7	77	W.	3	.04	Gentle	0	0	0	0	.....	Clear.
Vicksburg, Miss	30.12	+.03	71	+ 7	75	0	0	0	Calm	0	0	0	0	.....	Clear.
Virginia City, Mont															
Washington, D. C	29.91	+.11	52	— 5	67	W.	8	.32	Fresh	0	0	0	0	.....	Clear.
Wilmington, N. C	29.92	+.08	66	+ 3	64	S. W.	4	.08	Gentle	1 C.	N. W.	0	0	.....	Fair.
Yankton, Dak	29.82	—.06	67	+18	51	S. W.	8	.32	Fresh	0	0	0	0	.....	Clear.

PUBLISHED BY ORDER OF THE WAR DEPARTMENT.

NOTE.—Barometer corrected for temperature and elevation. Reports are received over circuits arranged at the War Department with the Western Union, Atlantic and Pacific, Franklin, Northwestern, and Southern and Atlantic Telegraph Companies, and are furnished gratuitously to such newspapers as desire to publish them for the benefit of their readers.

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PAPER 18.

BULLETIN OF INTERNATIONAL METEOROLOGICAL OBSERVATIONS TAKEN SIMULTANEOUSLY, ON JANUARY 13, 1874, AT—

7:35 a. m. Washington mean time.
0: 6 p. m. Lisbon mean time.
0:28 p. m. Madrid mean time.
0:43 p. m. Greenwich mean time.
0:53 p. m. Paris mean time.
1 : 1 p. m. Brussels mean time.
1 : 4 p. m. Utrecht mean time.
1 : 8 p. m. Geneva mean time.
1:26 p. m. Christiania mean time.
1:33 p. m. Copenhagen mean time.
1:33 p. m. Rome mean time.
1:37 p. m. Berlin mean time.
1:49 p. m. Vienna mean time.
2:39 p. m. Constantinople mean time.
2:44 p. m. St. Petersburg mean time.

ALGERIAN SERIES.

[Furnished by co-operation of M. Charles St. Claire Deville, inspector-general of Meteorological Establishments, Ministry of Public Instruction, Paris, and M. le Général Farre, Commandant Supérieur du Génie en Algérie.]

Place of observation.	BAROMETER. Observed. Inches.	BAROMETER. Observed. Millimeters.	BAROMETER. Reduced to sea-level. Inches.	BAROMETER. Reduced to sea-level. Millimeters.	THERMOMETER. Degrees Fahrenheit.	THERMOMETER. Degrees centigrade.	RELATIVE HUMIDITY. Per cent.	WIND. Direction from—	WIND. Velocity, (miles per hour.)	WIND. Force, (scale from 0 to 10.)	CLOUDS. Scale from 0 to 5.	RAIN. Inches.	RAIN. Millimeters.	State of weather.	Observer.
Algiers															
Aumale															
Batna															
Biskra															
Constantine															
Djelfa															
Larache, (or El Arish)															
Geriville															
La Calle															
Laghouat															
Medeah															
Nemours															
Oran															
Saida															
Tebessa															
Teniet elhad															

Reports for this date not received; reports commenced July 1, 1874.

NOTE.—The orivinals do not give the relative humidity, which is here supplied by Guyot's tables; they give the force of the wind on a scale of 0 to 7, the cloudiness on a scale of 0 to 10, and the weather by the general French notation.

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Bulletin of international meteorological observations, &c.—Continued.

AUSTRIAN SERIES.

[Furnished by co-operation of Professor Carl Jelinek, Director of the Imperial and Royal Central Meteorological Institute at Vienna.]

Place of observation.	BAROMETER.				THERMOMETER.		RELATIVE HUMIDITY.	WIND.			CLOUDS.	RAIN.		State of weather.]	Observer.
	Observed.		Reduced to sea-level.												
	Inches.	Millimeters.	Inches.	Millimeters.	Degrees Fahrenheit.	Degrees centigrade.	Per cent.	Direction from—	Velocity (miles per hour.)	Force, (scale from 0 to 10.)	Scale from 0 to 5.	Inches.	Millimeters.		
Agram	.....	.....	30.221	767.6	25.5	− 3.6	95	S. W.	.....	1	1	0	0	Fair	Ivan Stožir.
Aracow	.....	.....	29.969	761.2	33.4	0.8	66	W.	.....	3	5	0	0	Cloudy	I. R. Observatory.
Eperies	.....	.....	30.123	765.1	20.3	− 6.5	92	S.	.....	4	.....	.....	.....	Foggy	Julius Mikolik.
Gratz	.....	.....	30.154	765.9	22.3	− 5.4	82	S.	.....	2.5	0	0	0	Clear	Andreas Rospini.
Hermannstadt	.....	.....	30.316	770.0	− 4.7	−20.4	100	E.	.....	1	5	0	0	Cloudy	Prof. Ludw. Reisenberger.
Kremsmünster	.....	.....	30.138	765.5	37.7	3.2	83	W.	.....	1	4	0	0	Cloudy	Prof. Wagner.
Lemberg	.....	.....	29.914	759.8	24.6	− 4.1	89	S. W.	.....	4	4.5	0	0	Cloudy	Dr. Stanecki.
Nyir Egyhaza	.....	.....	30.193	766.9	20.1	− 6.6	89	S. W.	.....	2	5	.....	.....	Snow	Habzsuda Daniel.
Pola	.....	.....	30.146	765.7	41.5	5.3	78	W. N. W.	.....	1	0.5	0	0	Clear	Naval Observatory.
Szegedin	.....	.....	30.186	766.7	20.5	− 6.4	90	W.	.....	2	5	0	0	Cloudy	Karl Stancel.
Triest	.....	.....	30.146	765.7	40.3	4.6	68	N. W.	.....	0	0	0	0	Clear	Dr. Faroli.
Vienna	.....	.....	30.095	764.4	25.9	− 3.4	89	E.	.....	1	5	0	0	Clear	Central Observatory.
Buda	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Laibach	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—The originals give the wind-direction to 32 points of the compass, the force of wind and the cloudiness on a scale of 0 to 10, and the weather by the Vienna symbols.

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BELGIAN SERIES.

[Furnished by co-operation of Professor E. Quetelet, Director of the Royal Observatory at Brussels.]

Brussels	29.910	759.7	.....	.....	44.1	6.7	71	W. S. W.	.....	.....	3.5	.074	1.90	Cloudy.....	Royal Observatory.
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—The originals give the wind-force in kilogrames per square foot, the cloudiness on a scale of 0 to 10, and the weather in general notes.

BRITISH SERIES.

[Furnished by co-operation of Robert H. Scott, esq., Director of the Meteorological Office, London.]

Aberdeen	.....	.....	29.55	750.56	36.4	2.4	62	S.	.....	2	4.5	.....	.....	Misty.....	William Boswell.
Ardrossan	29.82	757.41	.....	.....	44	6.7	92	S. W.	.....	5	4	.....	.....	Light rain ..	William McNeil.
Annanhill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	W. H. Dunlop
Armagh Observatory	.....	.....	29.90	759.45	43.5	6.4	93	S. S. W.	24	.....	5	.....	.....	Threatening	Stillman Call.
Banbridge	29.72	754.87	.....	.....	43	6.1	89	S. W.	.....	3	4.5	.....	.....	Fair	John Smyth, jr
Battersea	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Rev. J P. Faunthorpe.
Barnstaple	30.17	766.30	.....	.....	48	8.9	74	S.	.....	2	0	.....	.....	Clear	William Knill.
Bidston, the Liverpool Observatory	.....	.....	30.01	762.24	45.1	7.3	67	W. S. W.	.....	3	5	.....	.....	Cloudy	The Liverpool Observatory.
Prospect, Bermuda	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	James Freeman.
Birr Castle	.....	.....	30.01	762.24	47.1	8.4	95	W. S. W.	.....	0.5	5	.....	.....	Cloudy.....	Ralph Copeland.
Bradford	.....	.....	29.95	760.72	42.1	5.6	74	S. W.	.....	2	5	.....	.....	Cloudy.....	J. Mc. Landsborough.
Bywell	29.75	755.64	.....	.....	44	6.7	60	N. W.	.....	3	1	.....	.....	Fair	John Dawson.
Cambridge Observatory	.....	.....	30.08	764.02	40.5	4.7	78	S. W.	.....	1	1.5	.....	.....	Fair	Henry Todd.
Cardington	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	John McLaren.
Carlisle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	T. Bell for J. Cartwell.
Cape Town, Cape of Good Hope	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	The Royal Observatory.
Cochyfoel Farm	.....	.....	30.04	763.00	45	7.2	88	S. W.	.....	4	5	.....	.....	Cloudy.....	W. Jones.
Donaghadee	29.90	759.45	.....	.....	42	5.6	91	S. S. W.	.....	.....	5	.....	.....	Cloudy.....	J. MacGowan, jr.
Dover	30.14	765.54	.....	.....	43	6.1	75	.....	.....	.....	1	.....	.....	Fair	J. Costello.
Dublin	.....	.....	29.94	760.46	46	7.8	86	W. S. W.	.....	4	3.5	.....	.....	.....	J. W. Moore.
Dartmoor	.....	.....	30.06	763.51	40.5	4.7	78	W.	.....	2	3	.....	.....	Cloudy.....	R. E. Power.
Durham Observatory.	.....	.....	29.86	758.43	41.6	5.3	72	W. S. W.	.....	2	5	.....	.....	Cloudy.....	John J. Plummer.
Eccles	.....	.....	30.03	762.75	42.5	5.8	77	W.	.....	1	5	.....	.....	Cloudy.....	Thomas Mackereth.
Falmouth Observatory	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	The Falmouth Observatory.
Gibraltar, (Mediterranean Sea)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	J. Brewster.
Glasgow Observatory	.....	.....	29.74	755.38	42.7	5.9	83	S. W.	.....	3	3.5	.....	.....	Threatening	James Gray.
Gloucester, the Gloucester Company Asylum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	E. Toller.
Greenwich Royal Observatory	30.00	761.99	.....	.....	43.3	6.3	70	W.	6	.....	0	.....	.....	Clear	The Royal Observatory.
Guernsey	.....	.....	30.19	766.81	47	8.3	81	N. N. W.	.....	1	3.5	.....	.....	Clearing	Dr. S. E. Hoskins.
Great Yarmouth	30.08	764.02	.....	.....	40	4.4	91	W.	.....	3	1.5	.....	.....	Fair	G. T. Watson.

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Bulletin of international meteorological observations, &c.—Continued.

BRITISH SERIES—Continued.

Place of observation.	BAROMETER. Observed. Inches.	BAROMETER. Observed. Millimeters.	BAROMETER. Reduced to sea-level. Inches.	BAROMETER. Reduced to sea-level. Millimeters.	THERMOMETER. Degrees Fahrenheit.	THERMOMETER. Degrees centigrade.	RELATIVE HUMIDITY. Per cent.	WIND. Direction from—	WIND. Velocity, (miles per hour.)	WIND. Force, (scale from 0 to 10.)	CLOUDS. Scale from 0 to 5.	RAIN. Inches.	RAIN. Millimeters.	State of weather.	Observer.
Galway	29.97	761.22	.....	.....	47	8.3	92	W.	.....	3	5	.....	.....	Misty	B. G. Clare.
Helston	.....	.....	30.19	766.81	50	10.0	79	W.	.....	2	0	.....	.....	Clear	W. Moyle.
Holyhead	29.95	760.72	.....	.....	47	8.3	85	S. W.	.....	4	3.5	.....	.....	Misty	John Tilston.
Hull Park	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Edward Peak.
Kew Observatory	.....	.....	30.13	765.29	42.5	5.8	73	W. by S.	.....	2	0.5	.....	.....	Fair	Kew Observatory.
Kingstown	30.05	763.26	.....	.....	48	8.9	85	W.	.....	.....	4	.....	.....	Cloudy	George Mitchell.
Leicester	.....	.....	30.01	761.73	43	6.1	75	S.	.....	2	4.5	.....	.....	Cloudy	William J. Harrison.
Llandudus	29.94	760.46	.....	.....	46.8	8.2	78	W. S. W.	.....	1	3.5	.....	.....	Cloudy	James Nicol.
Stornoway, Lews Castle	29.37	745.98	.....	.....	42	5.6	91	W. S. W.	.....	3	4.5	.....	.....	Light rain	John Smith.
Malta, (Mediterranean Sea)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	E. Dowling.
Marlborough College	.....	.....	30.14	765.54	39.8	4.3	76	W.	.....	0.1	5	.....	.....	Cloudy	T. A. Preston.
Moorside	29.53	750.05	.....	.....	39.8	4.3	84	W. S. W.	.....	2	5	.....	.....	Cloudy	L. J. Crossley.
Moville	29.78	756.40	.....	.....	43	6.1	100	S. W.	.....	5	5	.....	.....	Threatening	James McSladery.
Saint Ann's Head	.....	.....	30.10	764.53	48	8.9	78	W. S. W.	.....	3	5	.....	.....	Cloudy	John C. Walker.
Markree	29.81	757.16	.....	.....	45.5	7.5	98	S. W.	.....	3	5	.....	.....	Cloudy	Robert Smith.
Lampete	29.71	754.62	.....	.....	48	8.9	74	W.	.....	0.3	4	.....	.....	Cloudy	Eliezer James.
Nairn	29.58	751.32	.....	.....	44	6.7	84	W.	.....	3	3	.....	.....	Cloudy	William D. Penny.
Nottingham	.....	.....	30.05	763.26	44.1	6.7	84	W.	.....	2	4.5	.....	.....	Threatening	E. J. Lowe.
Osborne, New Barn Cottage	.....	.....	30.15	765.80	44	6.7	76	W. S. W.	3	.....	1.5	.....	.....	Fair	J. R. Mann.
North Shields	29.79	756.65	.....	.....	43	6.1	67	W. S. W.	.....	3	3.5	.....	.....	Cloudy	John William Irvine.
Oscott	.....	.....	30.06	763.51	41	5.0	82	S. W.	.....	3	5	.....	.....	Misty	Stephen Whitty.
Oxford, the Radcliffe Observatory	29.92	759.967	.....	.....	49	9.4	93	S. W.	.....	1	5	.....	.....	Misty	Radcliffe Observatory.
Plymouth	30.14	765.54	.....	.....	46	7.8	84	S. W.	.....	3	2.5	.....	.....	Foggy	John Merrifield.
Portishead	30.09	764.27	.....	.....	48	8.9	100	.....	.....	.....	4	.....	.....	Cloudy	W. Sandford.
Roche's Point	30.10	764.53	.....	.....	50	10.0	93	W. S. W.	.....	3	5	.....	.....	Misty	W. Kennedy.
Orkney, Sandwick Manse	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Rev. Charles Cloustin.
Scarborough	29.84	757.92	.....	.....	41	5.0	83	W. S. W.	.....	3	4	.....	.....	Cloudy	F. Heard.
Scutari, Turkey	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	W. H. Lyne.

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Sheffield														W. F. Cooper.
Streatley Vicarage			30.15	765.80	43.5	6.4	78	W.		1	4.5			Cloudy	Rev. John Slatter.
St. Helier, Jersey	30....	767.07			46.2	7.9	92	N. E.		1	5			Foggy	A. P. Amy.
Sidmouth	...20		30.15	765.80	46.7	8.2	82	W.		0	3			Cloudy	J. Ingleby Mackenzie.
Silloth Rectory															Rev. C. J. Stewart.
Somerleyton	29.85	758.18			44	6.7	82	S. W.		5	5	.035	.89	Light rain	Francis Redford.
Strathfield Turgiss			30.03	762.75	42	5.6	83	S. W.		1	0.5			Clear	Charles H. Griffith.
Sumburgh Head, Shetland Islands	30.12	765.03			43.5	6.4	70	W.		3	0			Clear	William Lawrence.
Stonyhurst Observatory	29.27	743.44			34	1.1	100	S.		1	5			Snow	Stonyhurst Observatory.
Taunton College	29.59	751.57			41.8	5.4	74	S. W.		2	5			Threatening	Rev. W. Tuckwell.
Thurso			30.14	765.54	47	8.3	67	W.		1	5			Cloudy	John Trotter.
Truro Royal Institution	29.48	748.78			42	5.6	74	S. W.		2	1			Fair	William Newcombe.
Wisbech			30.13	765.29	52	11.1	53	W.		3	2			Fair	S. H. Miller.
Worthing	30.02	762.49			41.8	5.4	81	S. S. W.		0.4	2			Fair	William J. Harris.
Wick			30.13	765.29	43.4	6.3	76	W.		3.5				Cloudy	James Sinclair.
York	29.52	749.79			35	1.7	90	S.		2	5			Snow	C. Wakefield.

NOTE.—The originals generally omit the relative humidity, which is here supplied by means of Guyot's Tables; they give the wind and weather on the Beaufort scales and the cloudiness on a scale of 0 to 10.

DANISH SERIES.

[Furnished by co-operation of Captain N. Hoffmeyer, Director of the Royal Danish Meteorological Institute at Copenhagen.]

Copenhagen			29.666	753.5	35.2	1.8	82	W.		5	1			Fair
Fano			29.705	754.5	38.7	3.7	75	W. N. W.		7	4			Cloudy
Thorshavn, (Faro)			29.044	737.7				W.		2	5			Cloudy
Vestervig			29.544	750.4	36.9	2.7	84	W. N. W.		8	4			Rain and hail
Stykkisholm, (Iceland)			29.697	754.3	0.1	−17.7	78	N. E.		3	0			Aurora

NOTE.—The originals give the force of the wind on a scale of 0 to 6, the cloudiness on a scale of 0 to 10, and the weather in the Vienna symbols.

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FRENCH SERIES.

[Furnished by co-operation of M. Charles St. Claire Deville, Inspector-General of Meteorological Establishments, and MM. Marie Davy, E. Renou, Dr. Fines, Dr. Berigny, Beaumier, etc.]

Place of observation.	BAROMETER.				THERMOMETER.		RELATIVE HUMIDITY.	WINDS.			CLOUDS.	RAIN.		State of weather.	Observer.
	Observed.		Reduced to sea-level.												
	Inches.	Millimeters.	Inches.	Millimeters.	Degrees, Fahrenheit.	Degrees, Centigrade.	Per cent.	Direction from—	Velocity, (miles per hour.)	Force, (scale from 0 to 10.)	Scale from 0 to 5.	Inches.	Millimeters.		
Goree															M. Lascal.
Montsouris, (near Paris)			30.190	766.8	45.5	7.5	93	S. S. W.			5	.039	1.0	Rain	Montsouris Observatory.
Saint Maur, (near Paris)			30.193	766.9	45.3	7.4	96	S.		1	5	.063	1.6	Rain	M. E. Renou.
Versailles, (near Paris)															Dr. Ad. Berigny.
Mont-Louis															M. Falguere.
Perpignan															Dr. Fines.
Mogador, (Marocco)															M. Beaumier.

Full arrangements at this date not yet completed. Full reports to commence on October 10, 1874.

NOTE.—The originals give the cloudiness on a scale of 0 to 10, the wind force on a scale of 0 to 7, and the weather in general terms; the wind velocity is given by Montsouris in kilometres per hour, but by Mont-Louis and Perpignan in metres per second.

GERMAN SERIES.

[Furnished by co-operation of Professor Carl Bruhns, Director of the Royal Observatory, Leipsig.]

Reports for this date not received. Reports commenced September 1, 1874.

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ITALIAN SERIES.

[Furnished by co-operation of Professor Giovanni Cantoni, Professor at the Royal University, Pavia, and M. P. F. Denza, Director of the Observatory of the Royal Carl Albert College, Moncalieri.]

Ancona															
Bologna															
Catania, (Sicily)															
Cosenza															
Domodossola															
Empoli															
Florence															
Genoa															
Leghorn															
Lodi															
Milan															
Moncalieri															
Naples															
Padua															
Palermo															
Pavia															
Placentia															
Rome															
Stelvio Pass															
Tolmezzo															
Turin															
Urbino															
Valdobbia															
Venice															
Velletri															
Vesuvius															
Vicenza															

Reports for this date not received. Reports commenced February 1, 1874.

NOTE.—The originals give the force of the wind on a scale of 0 to 5 (?) and in some cases the velocity in kilometres per hour; the cloudiness is given on a scale of 0 to 10; the weather is given in various general terms.

NETHERLAND SERIES.

[Furnished by co-operation of Professor Buys Ballot, Director of the Royal Meteorological Institute of the Netherlands at Utrecht.]

Groningen															
Helder			29.989	761.7	43.0	6.1		W. S. W.							
Utrecht			30.028	762.7	43.7	6.5	78	W.							
Flushing			30.138	765.5	43.2	6.2		W.							

NOTE.—The originals give the force of the wind in kilogrammes per square metre, and the cloudiness on a scale of 0 to 10.

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NORWEGIAN SERIES.

[Furnished by co-operation of Professor H. Mohn, Director of the Royal Norwegian Meteorological Institute at Christiania.]

Place of observation.	BAROMETER. Observed. Inches.	BAROMETER. Observed. Millimeters.	BAROMETER. Reduced to sea-level. Inches.	BAROMETER. Reduced to sea-level. Millimeters.	THERMOMETER. Degrees, Fahrenheit.	THERMOMETER. Degrees, Centigrade.	RELATIVE HUMIDITY. Per cent.	WINDS. Direction from—	WINDS. Velocity, (miles per hour.)	WINDS. Force, (scale from 0 to 10.)	CLOUDS. Scale from 0 to 5.	RAIN. Inches.	RAIN. Millimeters.	State of weather.	Observer.
Bergen	.....	.....	29.308	744.4	36.5	2.5	73	N.	.....	7	5	0	0	Cloudy	
Christiania	.....	.....	29.103	739.2	37.4	3.0	44	S. W.	12	6?	1	0	0	Fair	
Tromso	.....	.....	28.544	725.0	29.8	− 1.2	74	S. S. E.	.....	2	5	.....	.....	Cloudy	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	

NOTE.—The originals give the velocity of the wind in metres per second and its force on a scale of 0 to 6; the cloudiness on a scale of 0 to 10, and the weather in special terms.

PORTUGUESE SERIES.

[Furnished by co-operation of M. Fradesaa da Silveira, Director of the Observatory of the Royal Polytechnic School at Lisbon.]

Lisbon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	

Reports for this date not received. Reports commenced June 1, 1874.

NOTE.—The originals give the wind-velocity in kilometres per hour and the cloudiness on a scale of 0 to 10.

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RUSSIAN SERIES.

[Furnished by co-operation of Professor H. Wild, Director of the Imperial Russian Central Physical Observatory at St. Petersburg.]

Archangel			29.272	743.5			95	S.	17		5			Cloudy	Ogorodnikof.
Astrakhan			30.434	773.0			65	S E.	4						Sebastianof.
Barnaul			30.339	770.6			85	S. W.	17		5			Snow	Meteorological Observatory.
Dorpat			29.304	744.3			91	S.	13		4			Snow	Physical Cabinet.
Ekaterinburg			30.473	774.0			82	S. W.	8		5			Cloudy	Meteorological Observatory.
Yeniseisk			29.890	759.2			82	W.	17		0			Clear	Marks
Irkutsk															Usolzef.
Kasaly			30.445	773.3			84	E.			5			Cloudy	Bobrof.
Kasan			30.260	768.6			82	S.	13		1			Fair	Physical Cabinet.
Kertch															Lagorio.
Kieff			29.965	761.1			92	S. W.	17		5			Cloudy	Physical Cabinet.
Lugan			30.052	763.3			80	S. E.	6		4.5			Cloudy	Meteorological Observatory.
Moscow			29.894	759.3			65	S. W.	6		5			Cloudy	Meteorological Observatory.
Nertchinsk			29.953	760.8			82	Calm.	0		1			Fair	Meteorological Observatory.
Nikolaiev			30.099	764.5			96	E.	4		5			Cloudy	Kurdakof.
Nikolaievsk															
Orenburg															Tschernischef.
Peking, (China)			30.213	767.4			71	Calm.	0		0			Clear	Physical Observatory.
St. Petersburg			29.280	743.7			78	S.	13		5			Cloudy	Physical Observatory.
Taschkend			30.512	775.0			69	Calm.	0		3			Cloudy	Michelson.
Tiflis			30.162	766.1			57	S. W.	6		3.5			Cloudy	Physical Observatory.
Oorga			30.024	762.6			94	Calm.	0		0			Clear	Mossin.
Vladivostck															
Warsaw			29.741	755.4			98	W.	8		5			Cloudy	Astronomical Observatory.
Wilna			29.560	750.8			95	S. E.	13		5			Snow	Astronomical Observatory.

NOTE.—The originals give the velocity of the wind in metres per second; the cloudiness on a scale of 0 to 10, and the weather according to the Vienna system of symbols.

SCOTTISH SERIES.

[Furnished by co-operation of Mr. Alexander Buchan, Secretary of the Scottish Meteorological Society, Edinburgh.]

Calf of Man, (Isle of Man)															
Kestalrig Park, (Edinburgh)															
Monach Light-house, (Hebrides)															
North Unst, (Shetland)															

Reports for this date not received. Reports commenced February 1, 1874.

NOTE.—The originals give the force of the wind on a scale of from 0 to 10; the cloudiness on a scale of 0 to 6, and the weather by the Beaufort notation.

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SPANISH SERIES.

[Furnished by co-operation of M. A. Aguilar, Director of the Royal Observatory at Madrid.]

Place of observation.	BAROMETER.				THERMOMETER.		RELATIVE HUMIDITY.	WINDS.			CLOUDS.	RAIN.		State of weather.	Observer.
	Observed.		Reduced to sea-level.												
	Inches.	Millimeters.	Inches.	Millimeters.	Degrees, Fahrenheit.	Degrees, Centigrade.	Per cent.	Direction from—	Velocity, (miles per hour.)	Force, (scale from 0 to 10.)	Scale from 0 to 5.	Inches.	Millimeters.		
Madrid															

Reports for this date not received. Reports commenced April 1, 1874.

NOTE.—The originals give the velocity of the wind in kilometres per hour; the cloudiness from 0 to 10, and the weather in general terms.

SWISS SERIES.

[Furnished by co-operation of Professor E. Plantamour, Director of Geneva Observatory, Geneva.]

Geneva															

Reports for this date not received. Reports commenced September 1, 1874.

NOTE.—The originals give the force of the wind on a scale of 0 to 4; the cloudiness from 0 to 10, and the weather in general terms.

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TURKISH SERIES.

[Furnished by co-operation of A. Coumbary, Effendi, Director of the Central Observatory at Constantinople.]

Beirut, (Syria)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Constantinople	.....	.....	30. 099	764. 5	37. 8	3. 2	84	N.	13	.....	.....	.....	.....	Cloudy
Fao, (Persian Gulf)	.....	.....	30. 489	774. 4	58. 1	14. 5	.....	N. W.	.....	2	.....	.....	.....	Clear
Salonika	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Avlona	.....	.....	30. 008	762. 2	49. 6	9. 8	.....	N. E.	0	.....	.....	.....	.....	Clear
Varna	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE. The originals give the velocity of the wind in metres per second, and its force on a scale of 0 to 6; the weather and cloudiness are given in general terms.

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UNITED STATES SERIES.

[Furnished by the co-operation of Bvt. Brig. Gen. Albert J. Myer, Chief Signal-Officer, U. S. A.]

Place of observation.	Barometer, (inches.)	Barometer, (millimeters.)	Thermometer, (degrees Fahrenheit.)	Humidity—per cent.	WIND.		CLOUDS.			Rain-fall in last 8 hours, (inches.)	State of weather.
					Direction from the—	Velocity per hour, (English miles.)	Amount of lower, (Scale from 0 to 4.)	Amount of upper. (Scale from 0 to 4.)	Direction of upper, from the—		
Albany, N. Y	30. 45	773. 42	20	86	Calm	0	1	0	.....	.....	Fair.
Alpena, Mich	30. 40	772. 15	16	83	S. W.	5	1	0	.....	.....	Fair.
Augusta, Ga	30. 30	769. 61	41	91	N. E.	4	4	.....	.....	.04	Light rain.
Baltimore, Md	30. 47	773. 92	29	50	N. E.	4	2	1	.....	.....	Fair.
Boston, Mass	30. 48	774. 18	20	77	N. W.	6	Hazy	0	.....	.....	Fair.
Breckinridge, Minn	30. 69	779. 51	—20	64	N. W.	22	0	0	.....	.04	Clear.
Buffalo, N. Y	30. 44	773. 16	20	85	Calm	0	2	Hazy	.....	.....	Fair.
Burlington, Vt	30. 52	775. 19	16	66	N.	4	2	0	.....	.....	Fair.
Cairo, Ill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cape May, N. J	30. 46	773. 67	26	75	N.	8	0	Hazy	.....	.....	Fair.
Charleston, S. C	30. 28	769. 10	45	75	N. E.	10	4	.....	.....	.....	Cloudy.
Cheyenne, W. T	30. 00	761. 99	16	83	Calm	0	Fog	.....	.....	.....	Foggy.
Chicago, Ill	30. 19	766. 81	30	78	S. E.	12	4	.....	.....	.....	Cloudy.
Cincinnati, Ohio	30. 25	768. 34	30	78	N. E.	4	4	.....	.....	.....	Cloudy.
Cleveland, Ohio	30. 32	771. 11	23	60	S.	8	4	.....	.....	.....	Cloudy.
Corinne, Utah	30. 10	764. 53	25	87	S.	1	4	.....	.....	.....	Cloudy.
Davenport, Iowa	30. 22	767. 57	26	87	Calm	0	4	.....	.....	.....	Cloudy.
Denver, Col	30. 13	765. 29	20	70	N.	10	4	.....	.....	.....	Cloudy.
Detroit, Mich	30. 39	771. 89	20	55	S. E.	4	4	.....	.....	.....	Cloudy.
Dubuque, Iowa	30. 21	767. 32	21	79	Calm	0	4	.....	.....	.04	Heavy snow.
Du Luth, Minn	30. 35	770. 88	1	71	W.	16	2	Hazy	W.	.04	Fair.
Eastport, Me	30. 30	769. 61	14	64	N.	4	0	2	N.	.....	Fair.
Erie, Pa	30. 39	771. 89	20	78	S.	2	4	.....	.....	.....	Cloudy.
Escanaba, Mich	30. 24	768. 08	14	91	N. W.	8	4	.....	.....	.....	Cloudy.
Fort Benton, Mont	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Gibson, Ind. T	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Saint Michael, Alaska	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Sully, Dak	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Haven, Mich	30. 29	769. 35	25	37	E.	5	4	.....	.....	.....	Cloudy.
Galveston, Tex	30 04	763. 00	61	100	S.	7	Fog.	.....	.....	.....	Foggy.
Indianapolis, Ind	30. 17	766. 30	30	59	E.	6	4	.....	.....	.....	Cloudy.
Indianola, Tex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Island of Saint Paul, Behring Sea	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jacksonville, Fla	30. 20	767. 07	52	79	N.	4	4	.....	.....	.....	Cloudy.
Keokuk, Iowa	30. 21	767. 32	26	88	N. W.	2	4	.....	.....	.....	Cloudy.
Key West, Fla	30. 12	765. 03	67	84	N. E.	8	0	1	E.	.....	Fair.
Knoxville, Tenn	30. 10	764. 53	35	95	N. E.	1	4	.....	.....	.07	Cloudy.
La Crosse, Wis	30. 31	769. 86	21	79	S.	4	4	.....	.....	.....	Cloudy.
Lake City, Fla	30. 18	766. 56	50	93	N. E.	4	Fog.	.....	.....	.....	Foggy.
Leavenworth, Kans	30. 20	767. 07	32	78	N.	4	4	.....	.....	.....	Threatening.
Louisville, Ky	30. 16	766. 05	32	79	E.	8	4	.....	.....	.....	Threatening.
Lynchburgh, Va	30. 44	773. 16	31	64	N. E.	4	4	.....	.....	.....	Cloudy.
Marquette, Mich	30. 23	767. 83	19	84	Calm	0	4	.....	.....	.....	Cloudy.
Memphis, Tenn	30. 12	765. 03	35	100	N. W.	8	4	.....	.....	.05	Cloudy.
Milwaukee, Wis	30. 25	768. 34	28	83	S. E.	7	4	.....	.....	.....	Cloudy.
Mobile, Ala	30. 11	764. 78	57	93	Calm	0	3	0	.....	.01	Cloudy.
Montgomery, Ala	30. 16	766. 05	48	92	S. E.	8	4	.....	.....	.05	Threatening.
Mount Washington, N. H.	30. 03	762. 75	— 1	68	N. W.	18	1	1	.....	.....	Fair.
Nashville, Tenn	30. 11	764. 78	38	90	Calm	0	4	.....	.....	.02	Light rain.
New London, Conn	30. 49	774. 43	25	62	N. W.	4	0	Hazy	.....	.....	Clear.
New Orleans, La	30. 07	763. 76	59	82	S. W.	4	1	2	.....	.....	Fair.
New York, N. Y	30. 50	774. 69	27	70	N. E.	6	1	2	W.	.....	Fair.
Norfolk, Va	30. 42	772. 65	30	72	E.	4	0	2	.....	.....	Fair.
Omaha, Neb	30. 40	772. 15	8	89	N. W.	21	4	.....	.....	.....	Cloudy.
Oswego, N. Y	30. 48	774. 18	25	87	S.	3	4	.....	.....	.....	Cloudy.
Pembina, Dak	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia, Pa	30. 51	774. 94	25	68	N. E.	8	4	.....	.....	.....	Cloudy.
Pike's Peak, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh, Pa	29. 39	771. 89	20	85	N E.	6	Fog.	.....	S. E.	.....	Foggy.
Portland, Me	30. 41	772. 40	5	75	N. W.	4	0	0	.....	.....	Clear.
Portland, Oreg	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Punta Rassa, Fla	30. 16	766 05	61	88	N. E.	9	2	0	.....	.....	Fair.
Rochester, N. Y	30. 46	773. 67	22	79	W.	4	4	.....	.....	.....	Cloudy.
San Diego, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Cal	30. 09	764. 27	42	74	N. W.	8	4	.....	.....	.....	Cloudy.
Santa Fé, N. Mex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—The cloudiness is estimated by fourths by the Army Signal-Office.

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UNITED STATES SERIES—Continued.

[Furnished by the co-operation of Bvt. Brig. Gen. Albert J. Myer, Chief Signal-Officer, U. S. A.]

Place of observation.	Barometer, (inches.)	Barometer, (millimeters.)	Thermometer, (degrees Fahrenheit.)	Humidity—per cent.	WIND.		CLOUDS.			Rain-fall in last 8 hours, (inches.)	State of weather.
					Direction from the—	Velocity per hour, (English miles.)	Amount of lower. (Scale from 0 to 4.)	Amount of upper. (Scale from 0 to 4.)	Direction of upper, from the—		
Savannah, Ga	30.25	778.34	48	71	N. E.	4	4	.....	.....	.....	Cloudy.
Shreveport, La	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Saint Louis, Mo	30.05	763.26	30	89	N. E.	5	4	.....	.....	.01	Cloudy.
Saint Paul, Minn	30.29	769.35	8	89	N. W.	12	4	.....	.....	.02	Light snow.
Toledo, Ohio	30.35	770.88	24	73	E.	4	4	.....	.....	.....	Cloudy.
Vicksburg, Miss	30.06	763.51	50	100	N. W.	2	4	.....	.....	.55	Light rain.
Virginia City, Mont	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington, D. C	30.48	774.69	26	74	N. E.	4	2	1	S. W.	.....	Fair.
Wilmington, N. C	30.30	769.61	40	78	N. E.	7	4	.....	.....	.01	Cloudy.
Yankton, Dak	30.94	780.78	— 4	64	N. W.	26	4	.....	.....	.03	Light snow.
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
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....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—The cloudiness is estimated by fourths by the Army Signal-Office.

UNITED STATES SUBSERIES—WEST INDIES.

[Telegraphed and furnished daily by agents of the United States.]

Barbadoes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Guadaloupe	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Havana	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kingston, Jamaica	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Point de Santiago de Cuba	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Thomas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—The cloudiness is estimated by fourths by the Army Signal-Office.

WEST INDIAN SERIES.

[Furnished by co-operation of L'Abbe Marchesi, Almoner of the Military Hospital, St. Pierre, Martinique.]

Place of observation.	BAROMETER.				THERMOMETER.		RELATIVE HUMIDITY.	WINDS.			Clouds.	RAIN.		State of weather.	Observer.
	Obser'd.		Reduced to sea-level.												
	Inches.	Millimeters.	Inches.	Millimeters.	Degrees. (Fahrenheit.)	Degrees. (Centigrade.)	Per cent.	Direction from.	Velocity. (miles per hour.)	Force. (scale from 0 to 10.)	Scale from 0 to 5.	Inches.	Millimeters.		
St. Pierre, Martinique	....	....	.....	.....	....	....	....	.....	...	...	...	....	....	.....	
.....	....	....	.....	.....	....	....	....	.....	...	...	...	....	....	.....	
.....	....	....	.....	.....	....	....	....	.....	...	...	...	....	....	.....	
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.....	....	....	.....	.....	....	....	....	.....	...	...	...	....	....	.....	
.....	....	....	.....	.....	....	....	....	.....	...	...	...	....	....	.....	

Reports for this date not received; reports commenced July 18, 1874.
NOTE.—The originals give the force of wind on a scale of 0 to 6, and cloudiness on a scale of 0 to 4.

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CANADIAN SERIES.

[Furnished by co-operation of Prof. G. T. Kingston, Director of the Magnetic Observatory, Toronto, and Superintendent of the Meteorological Office of the Dominion of Canada, telegraphed to the Office of the Chief Signal-Officer daily, by arrangement.]

Place of observation.	Barometer, (inches.)	Barometer, (millimeters.)	Thermometer, (degrees Fahrenheit.)	Humidity, per cent—	WIND.		CLOUDS.			Rain fall in last eight hours, (inches.)	State of weather.
					Direction from the—	Velocity per hour, (English miles.)	Amount of lower. (Scale from 0 to 4.)	Amount of upper. (Scale from 0 to 4.)	Direction of upper, from the—		
Brockville, Canada	30.56	776.21	4	....	Calm.	0	0	1	.....	....	Fair.
Cape Roziere, Canada	20.22	767.57	9	68	W.	3	1	1	N. W.	....	Fair.
Chatham, New Brunsw'k	30.40	772.15	8	89	W.	6	0	1	S. W.	....	Clear.
Father Point, Canada	30.40	772.15	7	52	N. W.	7	4	....	.....	....	Cloudy.
Fort Garry, Manitoba	.....	.....	....	....	.....	....	....	....	.....	....	.....
Halifax, Nova Scotia	30.44	770.62	19	71	N. W.	5	4	....	.....	....	Cloudy.
Kingston, Canada	30.54	775.70	9	72	N. E.	5	0	2	E.	....	Fair.
Montreal, Canada	.....	.....	....	....	.....	....	....	....	.....	....	.....
Ottawa, Canada	.....	.....	....	....	.....	....	....	....	.....	....	.....
Port Dover, Canada	30.43	772.92	15	82	N.	7	0	4	.....	....	Cloudy.
Port Stanley, Canada	30.44	773.16	6	95	N.	1	4	....	.....	....	Cloudy.
Quebec, Canada	.....	.....	....	....	.....	....	....	....	.....	....	.....
Saugeen, Canada	30.45	773.42	15	82	Calm.	0	4	....	.....	....	Cloudy.
Sydney, Canada	30.25	768.84	23	72	W.	9	1	....	.....	....	Cloudy.
Toronto, Canada	30.44	773.16	15	87	N. E.	2	4	4	W.	....	Cloudy.
	.....	.....	....	....	.....	....	....	....	.....	....	.....

NOTE.—The cloudiness is estimated by fourths by the Army Signal-Office.
Collated at the Office of the Chief Signal-Officer of the Army, Washington, D. C.
The records which appear in this bulletin are copied from the regular exchanges of this Office, made in each instance in compliance with an especial request, and are published for the uses of the co-operating observers.

ALBERT J. MYER,
Brig. Gen., (Bvt. Asstd.,) Chief Signal-Officer U. S. A.

PAPER 20.

SMITHSONIAN INSTITUTION,
Washington, D. C., December 5, 1873.

DEAR SIR: About a year ago I made a proposition to you in regard to the transfer to your charge of the meteorological system of this institution, which I now beg leave to renew.

The abolition of the Franking privilege, and the loss which the Institution has suffered by the suspension of the First National Bank of this city, renders it necessary that other means than those of the Smithson income be obtained, if the system in question is to be continued. I dislike making an appeal to Congress for the purpose, since it might interfere with the appropriations that will be asked for on account of the system under your charge; but I think the Smithsonian system too valuable to be discontinued for want of a small appropriation for its support.

I have the honor to be, very truly yours,

JOSEPH HENRY,
Secretary Smithsonian Institution.

General A. J. MYER,
Chief Signal-Officer, U. S. A.

PAPER 21.

SMITHSONIAN INSTITUTION,
Washington, D. C., February 2, 1874.

To the Voluntary Meteorological Observers who have reported to the Smithsonian Institution:

It has been from the first a part of the policy of this institution to devote its energies to no field of research which can be as well cultivated by other means; and the United States Government having established a system of meteorological observations,

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and having made appropriation for its support, we have thought it for the best interest of the science to transfer the system of meteorological observations which has been so long continued by the Institution to that of the War Department, under the Chief Signal-Officer, General Myer.

The propriety of this transfer will be evident from the fact that the Institution has not the means of paying for printing blanks, postage, and the calculations and monthly publication of the results, and that the assistance which has heretofore been rendered in this way, by the Department of Agriculture, is now discontinued; furthermore, General Myer can combine these observations with those made with standard instruments now under his charge, and out of the whole form a more extended and harmonious system than any at present in existence.

We trust this transfer will meet the approbation of the observers generally, and we hope they will continue their voluntary co-operation—not with the expectation of being fully repaid for their unremitted labor, in many cases for a long series of years, but from the gratification which must result from the consciousness of having contributed to increase the sum of human knowledge. We trust also that the observers will continue to cherish an interest in the welfare and progress of the Smithsonian Institution, while, on our part, we shall in all cases, and at all times, be pleased to continue to answer any communication which may be addressed to us by them on scientific subjects.

We shall retain, for the present, all the records of observations which have been accumulating at the Institution during the last twenty-five years, and continue the work of their reduction and discussion up to the end of the year 1873.

The investigations relative to the rain up to 1866 have been published, and a supplement will be published giving the results since that time.

The temperature investigations are nearly finished, and those relative to the winds will be completed in the course of a month or two. The publication of the results will be made as rapidly as the means at our command will warrant. It is scarcely necessary to say that copies of these works will be distributed to all observers who have contributed the materials upon which these researches are based.

Very respectfully, your obedient servant,

JOSEPH HENRY,
Secretary Smithsonian Institution.

PAPER 22.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE,
Washington, D. C., February 16, 1874.

To the Voluntary Meteorological Observers who have reported to the Smithsonian Institution:

With the approval of the Secretary of War, and at the very courteous suggestion of the distinguished Secretary of the Smithsonian Institution, Prof. Joseph Henry, this Office has assumed such charge of the system of Meteorological Observations hitherto conducted by that Institution as may be found consistent with the interests of the public service. The voluntary Observers heretofore reporting to the Smithsonian Institution are therefore invited to continue their labors, reporting to this Office. Stamped Envelopes, Blank Forms, Instructions, &c., will be supplied upon application.

In assuming this care, the Chief Signal-Officer expresses the hope that the cordial and effective co-operation, so long had on the part of the Observers with the Smithsonian Institution, may be extended to this Office; and he is instructed to say that whatever of aid can be properly given by the War Department to facilitate their researches will be cheerfully tendered.

In recognition of their assistance it is proposed to furnish such Observers as may, by this arrangement, become correspondents of the Office, copies of papers from time to time published by it. The monthly Record Sheets of Observations made since January 1, 1874, in the form as hitherto addressed to the Smithsonian Institution, may hereafter be mailed addressed to the Chief Signal-Officer of the Army, Washington, D. C.

Very respectfully, your obedient servant,

ALBERT J. MYER,
Brig. Gen., (Bvt. Assgd.,) Chief Signal-Officer U. S. A.

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PAPER 23.

EXPLANATION OF THE COLUMNS.

BAROMETER.

Observed height.—Under this head are entered the records of observations made on the barometer at three hours daily—7 a. m., 2 p. m , and 9 p. m., (local time)—and, under the proper head, the daily mean will be given opposite the 7 a. m. observation.

Thermometer attached to Barometer.—Under this head are the records of the thermometer attached to the barometer, observations of which are necessary to correct the barometer for variations in height of the mercury on account of difference of temperature.

Barometer corrected for Temperature and Instrumental Error.—In this space are placed the figures which indicate the observations of the barometer reduced to 32° Fahrenheit by means of a table furnished by the Signal-Office; also corrected for the instrumental error, where this is known.

HYGROMETER.

Under this head are entered the records of the dry and wet bulb thermometers, from which the "Relative Humidity" is obtained by means of tables furnished by this Office.

RELATIVE HUMIDITY, OR FRACTION OF SATURATION.

The quantity of water in a state of vapor which a given space can contain depends on the temperature. When a given space has as much water as it can hold at a given temperature, it is said to be saturated with vapor. If the temperature be lowered, a portion of the vapor will be condensed into water, but the space will still be saturated. If the temperature be raised and no more vapor be admitted, the space will only be partially saturated. The numbers under the head of "Relative Humidity," therefore, denote the percentage of saturation, full saturation being indicated by 1.00 and half saturation by 0.50.

STATE OF WEATHER.

In this column will be given the state of the weather at each observation.

EXPOSED THERMOMETER.

This is intended for the register of the thermometer and for the daily mean or average of the three observations. The daily mean, with the maximum and minimum, will be entered in the proper columns and opposite the morning observation.

RAIN AND SNOW.

Under this head are entered the times of beginning and ending of the fall of rain or snow, and the amount, in inches and hundredths, of rain or melted snow collected in a gauge at the surface of the ground; also the depth of the snow. Rain to be indicated by R. and snow by S. When there is no rain or snow, mark 0.

CLOUDS.

Under this head are entered three daily observations on the aspect of the sky, &c.: 1st. The "Amount of cloudiness," designated by figures, 10 being entire cloudiness; 5, half-cloudiness; 0, entire clearness; and intermediate numbers in proportion; 2d. "Motion of the higher clouds," which pass directly over the head of the observer, as given to eight points of the compass. The direction *from* which they move is to be given. This observation is important, as the course of the *higher clouds* is sometimes different from that of the *surface-wind*, which is given in another column. 3d. The "Velocity," or rate of motion, 10 being the highest and 0 apparent rest. 4th. The description or "Kind of clouds," to be entered by means of the following abbreviations: *St., stratus; Cu., cumulus; Cir., cirrus; Nim., nimbus; Cir. st., cirro-stratus; Cu. st., cumulo-stratus; Cir. cu., cirro-cumulus.*

WINDS.

This is for the record of the direction *from* which the wind is blowing, as indicated by a vane, and its force by estimation. The direction is entered in eight points of the

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compass: N., N. E., E., S. E., S., S. W., W., N. W. The force is to be estimated and registered by figures from 1 to 10, as in the first column of the following table. The figures in the last column, expressing the number of miles per hour, are *not to be used* in the register.

		Miles per hour.
1.	Very light breeze	2
2.	Gentle breeze	4
3.	Fresh breeze	12
4.	Strong wind	25
5.	High wind	35
6.	Gale	45
7.	Strong gale	60
8.	Violent gale	75
9.	Hurricane	90
10.	Most violent hurricane	100

GENERAL REMARKS AND DIRECTIONS.

PRESSURE OF THE ATMOSPHERE.

The barometer may be conveniently placed within doors, in a room not subjected to sudden changes of temperature, in a good light, but shaded from the direct rays of the sun. It should be secured in a vertical position by means of a plumb-line applied to the front and side. Its height above the surface of the ground and also above the level of the sea ought to be ascertained.

To observe the barometer, first note the degree of the attached thermometer, because the heat of the body may affect this. Next, adjust the cistern until the mercury just touches the ivory point. Then gently tap the case, so as to lessen the adhesion of the mercury to the tube, and measure the height of the column. To do this, lower the vernier until the plane passing through the two lower opposite edges of it is exactly tangent to the surface of the convex top of the column. Lastly, read the vernier, and enter the results in the proper column.

TEMPERATURE.

Heat of all kinds readily passes through the air; and, as all bodies are continually radiating it, a thermometer exposed to a clear sky, which reflects back no rays, will fall several degrees below the temperature of the air; hence, when the object of meteorologists is to obtain the temperature of the air, the thermometer ought not to be exposed to any portion of the sky. Also, from the fact that heat of low intensity does radiate through glass, the thermometer may be placed on the outside of a double window without being materially affected by the heat within.

MOISTURE.

Another important meteorological element is the amount of moisture in the air. This, with the amount and distribution of heat, are elements most essential to the agriculturist, since they principally determine the capability of different districts for the production of vegetable life.

Different views have been entertained as to the manner in which moisture is contained in the air. According to Saussure and the older meteorologists, it was considered as dissolved in the atmosphere, and that the solvent power of the latter for the former increased with the temperature. According, however, to later meteorologists, the vapor in the atmosphere exists in an independent state. Dalton, who first advanced this hypothesis, proved conclusively that water in a vacuum gives off a new portion of vapor which is forced into the same space at every increase of heat, and that, consequently, the density and elastic force of vapor in free space depend entirely on the temperature to which the water is submitted.

RAIN AND SNOW.

Another element of meteorology is the amount of rain which falls on different parts of the earth. The simplest method of determining this would be to expose a cylindrical or square vessel freely to the rain, and to measure the depth of the water which is caught in it after each storm or shower. Greater precision, however, is obtained by employing a rain-gauge, which consists of a circular or square funnel, with a jug below to receive the water and a measuring-vessel to estimate the quantity. If the area of the orifice of the funnel be one hundred times that of the measuring vessel, each inch of the latter

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will indicate a hundredth of an inch of rain falling on the earth adjacent. The gauge should be placed so that it may not be sheltered in any direction by buildings or trees from the oblique descent of the rain. The whole apparatus should be sunk in the earth in a cask provided with a wooden cover, with the mouth of the funnel a few inches above the surface of the ground. Care should be taken that the rain does not rebound from the surface into the funnel; to prevent this, the surrounding space may be covered with old carpet or cloth.

To ascertain the amount of water produced from snow, a column of the depth of the fall of snow, and of the same diameter as the amount of the gauge, should be melted and measured as so much rain. As a general average, it will be found that about ten inches of snow will make one of water.

CONCLUSION.

The above directions are applicable to full sets of standard instruments. But few of the observers are furnished with these, and, therefore, results of a very precise character are not, in most instances, to be expected. The observer ought, however, in all cases, to render his results as accurate as possible, and not to consider them of little value even though they should fall far below his ideal standard of perfection. Though the barometer may not give the absolute pressure of the atmosphere, yet it may serve to indicate the time of maximum and minimum pressure, and its oscillations may be comparable with each other, and thus be of value in ascertaining the law of transmission of atmospheric waves. So, also, the thermometer, though its scale may not be entirely correct in every part, yet the probability is that, in the course of the year, the errors will compensate each other and the mean temperature of the place be made known. This may also be the case, although the instrument has sometimes indicated too high and sometimes too low a temperature, on account of its proximity to buildings or other large objects less liable to be suddenly affected by heat or cold.

NOTE.—The Chief Signal-Officer requests that, wherever practicable, observers will make their observations correspond in local time with those made at regular stations, viz: 7.35 a. m., 4.35 p. m., and 11 p. m., Washington mean time. If it is found impracticable to make *all* of the observations at these hours, it is suggested that at least *one* may be made without inconvenience, and, in this case, that at 7.35 a. m. (Washington time) is preferred.

CASUAL PHENOMENA.

Note observations of the following:

Thunder-storms.—Time of occurrence and direction of motion.

Tornadoes.—Time of occurrence, width and direction of path, effects produced, and whether attended by electricity or hail.

Lightning at a distance.—Time of occurrence, direction from observer, whether zigzag, forked, or diffuse. Objects struck by lightning, as trees, buildings, &c.

Hail-storms.—Time of occurrence, direction and width of path, size and quantity of stones, and amount of injury.

Aurora borealis.—Time of appearance and disappearance, time of the formation of arch, beams, and corona, and whether there is a dark cloud below the arch.

Direction and time of occurrence of *meteors, shooting-stars, solar and lunar halos, parhelia,* and *paraselenes.*

Time of early and late *frosts,* particularly first and last.

Depth of ground frozen, in feet and inches; disappearance of frost from the ground.

Time of closing and opening of *rivers, lakes, canals, and streams,* and their extreme rise and fall.

Temperature of wells and springs at least once each season.

Earthquakes.—Time of occurrence, direction of impulse, number of shocks, and effects produced.

Hazy or smoky appearance of the atmosphere.—Time of occurrence and intensity.

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(Form E.)

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Meteorological record for the month of ——, 187–.

Date of observation.	Time of observation.	Observed reading of barometer.	THERM.		Barometer corrected for temperature and instrumental error.	HYGROM.		Relative humidity.	WIND.		LOWER CLOUDS		UPPER CLOUDS.			RAIN OR SNOW.		Amount of rain or melted snow, (inches.)	Maximum and minimum thermometers.	DAILY MEAN.		Weather.	Remarks.
			Attached to barometer.	Exposed, (open air.)		Dry bulb.	Wet bulb.		Direction from which it blows.	Force.	Kind.	Amount, scale of 10.	Kind.	Amount.	Direction, (moving from—)	Time commenced	Time ended.			Barometer.	Thermometer.		
A. M.																							
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Meteorological record for the month of ——, 187-.—Continued.

Date of observation.	Time of observation.	Observed reading of barometer.	THERM.		Barometer corrected for temperature and instrumental error.	HYGROM.		Relative humidity.	WIND.		LOWER CLOUDS		UPPER CLOUDS.			RAIN OR SNOW.		Amount of rain or melted snow, (inches.)	Maximum and minimum thermometers.	DAILY MEAN.		Weather.	Remarks.
			Attached to barometer.	Exposed, (open air.)		Dry bulb.	Wet bulb.		Direction from which it blows.	Force.	Kind.	Amount, scale of 10.	Kind.	Amount.	Direction, (moving from—)	Time commenced	Time ended.			Barometer.	Thermometer.		
A. M.																							
P. M.																							
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Monthly means																							

——— ———, *Observer*.

Station, ———.
Latitude, ———.
Longitude, ———.

Number of barometer used during month, ———.
Instrumental error, ———.
Elevation of surface of mercury in cistern of barometer above sea-level, ——— feet.

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PAPER 24.

METEOROLOGICAL REGISTER.

Station, ———. *Latitude,* ———, *Longitude,* ———. *Altitude of barometer above sea,* ——— *feet.*

187—. Month.	Thermometer.				Self-registering thermometer.			Movements of atmosphere.									Amount of cloudiness.			Rain and melted snow.			Remarks.
								7 a. m.			2 p. m.			9 p. m.									
	7 a. m.	2 p. m.	9 p. m.	Daily mean.	Maximum.	Minimum.	Mean.	Winds.		Motion of clouds.	Winds.		Motion of clouds.	Winds.		Motion of clouds.	7 a. m.	2 p. m.	9 p. m.	Began.	Ended.	Quantity.	
								D.	F.		D.	F.		D.	F.								

SUMMARIES OF WINDS AND WEATHER.

N.		N. E.		E.		S. E.		S.		S. W.		W.		N. W.	
Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.

Average cloudiness. } Number of days of rain and hail. } Number of days of snow. }

——— ———, *Surgeon U. S. Army.*

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PAPER 24—Continued.

187—.	Dry and wet bulb thermometer.													Remarks.
Month.	7 a. m.		2 p. m.		9 p. m.		Month.	7 a. m.		2 p. m.		9 p. m.		
	Dry-bulb.	Wet-bulb.	Dry-bulb.	Wet-bulb.	Dry-bulb.	Wet-bulb.		Dry-bulb.	Wet-bulb.	Dry-bulb.	Wet-bulb.	Dry-bulb.	Wet-bulb.	
1							17							
2							18							
3							19							
4							20							
5							21							
6							22							
7							23							
8							24							
9							25							
10							26							
11							27							
12							28							
13							29							
14							30							
15							31							
16														
Monthly mean														

187—.	Barometer and thermometer attached.						Remarks.
Month.	7 a. m.		2 p. m.		9 p. m.		
	Bar.	Ther.	Bar.	Ther.	Bar.	Ther.	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

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PAPER 28.

[Circular No. 7.]

WAR DEPARTMENT, OFFICE CHIEF SIGNAL-OFFICER,
Washington, D. C., March 10, 1874.

The following rules will be observed in addition to those contained in General Orders No. 28, War Department, Office Chief Signal-Officer, dated Washington, September 1, 1873:

The officer or assistant in charge of the preparation of facts, &c., for publication, will, in addition to his other duties, determine the percentage of verification of the current probabilities in accordance with the following instructions:

1. The blank forms already prepared to facilitate this work will be used with the following modifications: The column of the blank headed "Wind velocity" will not be used. The percentage of verifications of predictions referring to wind will be determined by considering only that portion of the predictions which refers to the direction of the wind. Predictions referring to the velocity of the wind are of decided importance, and should be frequently made, but the limited number of stations now reporting will not justify the consideration of such predictions as an independent element of verifications.

2. The sixth column of the blank will be used for special predictions, and so designated. Three blanks will be used for each month's percentages, and will be numbered, respectively, 1, 2, and 3; blank No. 1 referring to New England, Middle States, South Atlantic States, and Eastern Gulf States; blank No. 2, referring to the Lower Lakes, Upper Lakes, Tennessee, and Ohio Valley, and Western Gulf States; blank No. 3 referring to Upper Mississippi Valley, Lower Missouri Valley, the Northwest, and the Pacific States.

3. The probabilities made up from each report will be carefully compared with the facts as obtained from the three succeeding tri-daily reports unless the prediction applies to a definite time, in which case the prediction will determine the facts with which it is to be compared.

4. In estimations of percentages it will be determined whether the conditions announced as to prevail in each district named have prevailed over geographical sections of that district to the amount of one-fourth, one-half, three-fourths, or the whole of the extent of the district. All predictions which are found to be more than three-fourths verified will be considered completely verified, and represented by 100, or one hundred per cent., in that column of the blank to which the prediction refers. Predictions which are not wholly verified will be represented in the proper column of the blank by 75 per cent., 50 per cent., or 25 per cent., as the facts may warrant. Predictions which fall below 25 per cent. in verification will be rated as not verified, and represented by 000 in the proper column.

5. If in the probabilities for any particular district any class of prediction is not referred to, such omission will be represented by a dash (—).

6. The percentage of verifications of a single class of predictions will be determined by dividing the sum of the percentages of that class for the month by the number of predictions of that particular class. The percentage of verifications of probabilities for any district will be determined by dividing the sum of the percentages of the several classes of predictions by the number of classes. The percentage of verifications of probabilities for the United States will be determined by dividing the sum of the percentage of verifications of probabilities by the number of districts.

7. A maximum percentage of verifications can only be obtained when the four elements under each district are named in the probabilities of the entire month.

8. The percentage of failures to predict for any element will be determined by dividing the number of failures to predict for that particular element by the entire number of tri-daily reports during the month.

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PAPER 29.

PERCENTAGE OF VERIFICATION OF PROBABILITIES.

No. 1.—*For September, 1874.*

September, 1874.	New England States.					Middle States.					South Atlantic States.					Eastern Gulf States.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
1	100	100	100	75	....	100	100	100	100	..	75	100	100	100	..	100	100	100	75	..
	100	75	0	50	....	100	50	100	50	..	100	100	100	25	..	75	100	100	100	..
	100	75	25	75	....	100	25	100	0	..	75	75	75	75	..	75	100	100	75	..
	100	75		25	....	100	100	100		..	100	75	100	75	..	100	100	100	25	..
2	75	25	50	100	....	100	50	75	100	..	100	100	100	100	..	75	100	100	100	..
	75	75	25	50	....	100	50	75	75	..	100	100	100	75	..		50	50	25	..
	100	75	50	25	....	75	75	100	75	..	100	25	100	100	..	75	50	100	75	..
3	0	50			....	25	100			..	100	100	100	0	..	100	75	100	25	..
	100	75	100	100	....	75	75	100	100	..	100	50	75	100	..	50	75	75	100	..
4	100	75	100	75	....	100	75	100	25	..	100	100	100	100	..	100	75	100	0	..
	100	100	100	100	....	100	100	100	100	..	50	75	50	100	..	100	100		100	..
	100	100	100	25	....	100	100		0	..	100	75	100	0	..	100	100	0	50	..
5	25	100	100	100	....	75	100	100	100	..	75	75	75	50	..	100	100	75	100	..
	100	100	100	100	....	100	100	100	100	..	75	100	50	75	..	25	100			..
	75	100	100	100	....	100	100	75	75	..	100	100	50	100	..	50	50	100	100	..
	50	75		100	....	50	75	75	100	..	75	75	50	100	..	50	100	100	100	..
6	100	100	75	0	....	100	100	50	100	..	50	50	100	0	..	75	75	100	25	..
	100	75	75	100	....	100	100	50	100	..	100	100	100	100	..	50	100	100	100	..
	100	75	100	25	50	100	100	75	100	..	75	75	100	100	..	100	100		100	..
7	100	75	75	75	....	75	75	100	0	..	100	50	100	100	..	100	100	100	100	..
	100	50	100	100	....	50	75	100	50	..	75	25	100	0	..	100	100	100	0	..
	50	75	100	100	....	25	75	100	100	..	75	100	100	100	..	75	100	100	100	..
8	50	100		0	....	50	100		25	..	75	50	50	100	..	25	100	100	100	..
	100	75	100	100	....	0	75	25	100	..	75	75	100	100	..	50	100	100	0	..
	100	25	100	50	....	100	75	25	100	..	75	100	50	100	..	25	100	100	0	..
9	100	100	100	0	....	100	25	75	100	0	25	100	0	50	..	100	100	100	0	..
	100	50	100	100	....	100	50	100	100	..	75	100	50	0	..	100	100	100	25	..
	100	100	100	100	....	100	25	25	100	..	75	100	50	100	..	100	75	100	100	..
10	75	100	50	25	....	100	50	75	100	..	100	75	100	0	..	75	100	100	100	..
	100	100	100	100	....	100	75	50	75	..	100	75	100	0	..	75	100	100	100	..
	100	100	25	100	....	100	100	100	75	..	50	100	50	50	..	100	100	100	100	..
11	100	100	0	100	....	100	50	50	0	..	100	100	100	100	..	100	100	0	0	0
	100	100	100	100	....	100	100	75	25	..	100	100	100	100	..	100	100	100	100	..

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PERCENTAGE OF VERIFICATION OF PROBABILITIES—Continued.

No. 1.—*For September*, 1874.

September, 1874.	New England States.					Middle States.					South Atlantic States.					Eastern Gulf States.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
12	100	75	100	75	....	100	75	50	0	..	100	100		100	..	100	100	50	100	..
	75	100	100	0	....	100	100	50	0	..	75	100	100	50	..	100	100	100	75	..
	100	100	100		....	75	100	100	100	..	100	100	100	100	..	100	100	100	100	..
13	75	100	100	50	....	75	100	50	50	..	100	100	100	100	..	100	100	100	100	..
	100	50	100	100	....	100	100	100	100	..	75	75		50	..	100	100	100	100	..
	100	100	100	100	....	75	100	50	100	..	50	50	100	25	..	100	50	75	100	..
14	75	100	100	100	....	75	100	50	100	..	100	75	100	100	..	100	100	75	100	..
	100	100	50	100	....	100	75	50	100	..	100	100	50	100	..	100	50	100	75	..
	100	100	100	100	....	100	50	50	100	..	75	50		100	..	75	75		100	..
15	100	100	100	100	....	100	100	50	100	..	100	50	100	100	..	100	25	50	100	..
	100	75	25	0	....	25	0	100	25	..	50	50	0	100	..	100	75	50	0	..
	100	75	75	100	....	0	25	100	50	..	50	50	25	0	..	25	25	50	0	..
	100	100	25	0	....	50	100		100	..	50		100	50	..	100	25	25	0	..
16	100	50	100	100	....	25	25	50	50	..	75	50	75	100	..	100	75	0	25	..
	100	50	100	100	....	0	50		25	..	75	25	25	100	..	100	25	100	75	..
	100	75	100	100	....	100	100	100	75	..	75	100	100	100	..	0	100	100	100	..
17	100	100	100	0	....	50	75	50	0	..	100	100	100	0	..	75	100	100	0	..
	100	100	100	50	....	75	50	75	100	..	100	100	100	100	..	75	100	100	100	..
	100	75	100	75	....	75	50	100	100	..	75	100	100	100	..	75	100	100	0	..
18	100	75	75	100	....	75	100	75	100	..	75	100	50	100	..	100	50	75	100	..
	100	100	75	100	....	100	100	50	50	..	75	100	25	50	..	100	50	100	75	..
	100	75	75	100	....	100	100	100	100	..	75	100	50	100	..	100	25	75	100	..
19	100	100	75	100	....	75	75	25	75	..	75	100	100	25	..	100	100	100	100	..
	100	75	100	75	....	75	75	25	75	..	75	25		100	..	100	0		100	..
	100	75	75	100	....	100	50	100	100	..	75	100	75	100	..	100	100	100	100	..
20	25	0	100	0	....	100	100	100	100	..	100	25	100	100	..	100	100	50	100	..
	100	100	100	100	....	100	100	100	100	..	100	100	100	100	..	100	100	100	0	..
	100	100	100	100	....	100	100	100	100	..	100	100	100	100	..	100	100	100	75	..
21	100	100	75	100	....	100	75	100	100	..	100	100	100	100	..	100	100	50	50	..
	100	100	75	100	....	100	75	75	100	..	100	100	100	0	..	100	100	100	100	..
	100	100	100	100	....	100	100	75	100	..	100	100	25	50	..	100	100	50	100	..
22	100	100	75	75	....	100	100	100	100	..	100	100	75	75	..	100	100	100	75	..
	100	100	75	50	....	100	100	100	100	..	100	100	100	75	..	100	100	100	100	..
	75	100	100	50	....	100	100	100	100	..	100	100	100	100	..	75	100	100	100	..
23	100	100	100	75	....	100	100	100	100	..	75	100	100	25	..	50	75	100	100	..
	100	100	75	100	....	100	100	100	0	..	75	100	100	0	..	50	100	50	50	..

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24	100	100	100	75	....	100	100	100	100	..	100	100	50	50	..	50	100	100	0	..
	100	100	100	100	....	100	100	100	100	..	25	100	25	75	..	100	100	100	75	..
	100	100	100	100	....	100	75	100	100	..	50	100	100	75	..	100	100	100	50	..
25	100	100	100	100	....	100	100	100	100	..	100	100	100	100	..	100	100	100	100	..
	100	100	50	100	....	100	100	100	100	..	50	75	100	0	..	100	50	25	50	..
	100	100	100	100	....	100	100	100	100	..	50		50	0	..	100	100	50	0	..
26	100	100	100	100	....	100	100	100	100	..	75	100	100	100	..	100	100	100	50	..
	50	100	0	100	....	75	100	25	100	..	25	100	100	100	..	50	100	100	0	..
	100	50	50	100	....	100	100	100	100	..	100	100	25	0	..	0	100	100	0	..
27	50	100	25	100	....	50	75	50	100	..	100	100		100	..	100	100		100	..
	100	100	100	75	....	75	50		100	..	100	75	100	100	..	25	100	0	100	..
	75	100	50	100	....	100	50	100	100	..	100	75	75	75	..	100	100	100	100	..
28	100	75	100	100	....	100	75	100	100	..	100	100		100	..	100	100	100	100	..
	100	100	100	100	....	100	75	100	100	..	100	100	75	100	..	100	100	100	100	..
	100	100	100	100	....	100	75	100	50	..	100	100	50	100	..	100	100	50	100	..
29	100	75	100	100	....	75	100	100	100	..	100	100	100	100	..	100	100	100	100	..
	75	0	100	50	0	100	100	100	100	..	100	100	100	100	..	100	100	100	100	..
	100	100	100		100	50	75	100	100	..	100	100	100	100	..	100	75	100	100	..
30	75	100	100	100	....	75	100	100	100	..	100	100	100	100	..	100	100	100	50	..
	100	75	75	100	....	100	100	100	50	..	100	75	25	100	..	100	100	100	100	..
	100	75	75	75	....	100	75	100	50	..	100	75	50	100	..	100	100	50	100	..
Total percentages	8,225	7,600	7,100	6,825	150	7,625	7,275	6,850	6,975	0	7,550	7,475	6,675	6,625	..	7,550	7,875	7,150	6,375	0
Number of failures to predict	0	0	4	3	....	0	0	6	2	..	0	2	6	0	..	1	0	6	1	..
Number of predictions	90	90	86	87	3	90	90	84	88	1	90	88	84	90	0	89	90	84	89	1
Percentage of verifications	91.388	84.444	82.558	78.448	50	84.727	80.833	81.547	79.261	0	83.888	84.943	79.464	73.611	..	84.831	87.500	85.119	71.629	0
Percentage of failures	0	0	.0444	.0333	....	0	0	.0666	.0222	..	0	.0222	.0666	0	..	.0111	0	.0666	.011	..

PERCENTAGE OF VERIFICATION OF PROBABILITIES.

No. 2.—*For September*, 1874.

September, 1874.	Western Gulf States.					Tennessee and Ohio Valley.					Lower Lake region.					Upper Lake region.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
1	100	100	100	100	....	100	100	100	100	..	100	50	100	100	..	100	100	100	100	..
	100		100	0	....	100	50	100	0	..	100	25	100	100	..	100	100	75		..
	75	100	75	50	....	100	50	100	0	..	100	100		0	..	25	50		100	..
2	100	100	100	50	....	100	75	100	0	..	75	100	100	100	..	100	50		50	..
	100	75	75	50	....	75	75	50	50	..	25	100	100	100	..	100	50	100	100	..
		50	50	25	....	100	50	25	25	..	100	75	100	100	..	100	50	100	75	..
3	0	25	50	0	....	0	75	25	25	..	100	75	100	100	..	100	50	100	50	..
	100	50	75	100	....	75	75	75	100	..	25	100			..	75	100	100	100	..
	25	75	100	50	....	100	25	50	0	..	100	100	100	0	..	25	100	100	100	..
	75	75	100	50	....	75	100	100	75	..	100	100	100	0	..	25	100	100	100	..
4	100	100		100	....	50	100	75	0	..	25	100	100	100	..	100	75	100	75	..
	75	75	100	50	....	100	100	25	25	..	100	50	100	100	..	100	25	100	50	..
	100	100	0	50	....	100	100	25	0	..	100	100	100	75	..	75	100	50	25	..
5	100	75		100	100	100	25	100	0	..	100	100	75	100	..	100	75	100	50	..
	100	75	100	50	....	100	100	100	100	..	100	100	50	100	..	100	50	100	50	..
	100	75	100	100	....	50	100	100	0	..	100	100	50	100	..	75	100	100	100	..
6	100	100	100	100	....	100	100	100	0	..	100	50	100	75	..	100	100	100	100	..
	25	100	100	100	....	100	100	75	50	..	100	75	75	100	..	50	100	100	100	..
7	100	100		100	....	100	100	75	100	..	75	100		50	..	100	100		100	..
	75	100		100	....	0	50	100	100	..	100	50	100	100	..	0	25	100	0	..
	100	100	100	25	....	100	75	100	0	..	100	100	100	100	..	100	100	100	100	..
8	100	100	100	50	....	100	100	100	0	..	100	100	100	100	..	100	50	100	100	..
	100	100	100	100	....	0	75	100	100	..	50	50		50	..	75	100	100	75	..
	100	100	100	0	....	0	100	25	100	..	100	100	75	100	..	100	100	50	100	..
9	100	100	100	100	....	50	75	100	100	..	100	75	75	100	..	50	100	25	100	..
	100	100	100	100	....	75	100	100	100	..	100	50	100	0	..	50	100	100	75	..
	100	100	100	0	....	50	50	0	100	..	100	100	100	100	..	100	100	50	100	..
10	100	75	100	0	....	100	100	50	50	..	50	75	75	100	..	100	100	100	100	..
	100	100	100	100	....	75	100	50	25	..	50	100	100	100	..	75	50	75	100	..
	100	100	100	100	....	100	75	100	100	..	100	75	75	100	..	100	75	50	100	..
11	100	100	100	100	....	100	100	75	100	..	75	100	75	100	..	100	100	50	100	..
	100	100	50	0	....	100	50	100	0	..	100	100	75	100	..	100	50	75	75	..
	100	100	75	100	0	100	100	100	100	..	100	25	50	100	..	75	75	75	100	..

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PERCENTAGE OF VERIFICATION OF PROBABILITIES—Continued.

No. 2.—*For September*, 1874.

September, 1874.	Western Gulf States.					Tennessee and Ohio Valley.					Lower Lake region.					Upper Lake region.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
29	100	75	75	100	....	100	75	0	75	..	50	75	100	25	..	100	100	75	100	..
	100	50	100	100	....	100	75	75	100	..	50	100	100	100	..	100	75	25	75	..
	100	75	100	100	....	100	75	50	100	..	50	100	100	100	..	100	100	25	75	..
30	100	100	100	50	....	100	100	50	100	..	100	100	100	100	..	100	75	100	75	..
	100	100	100	100	....	100	50	100	0	..	75	50	0	0	..	75	75	100	75	..
	75	100	100	100	....	100	100	100	100	..	50	100	0	0	..	75	100	100	100	..
Total percentages.....	7,050	7,700	6,825	6,225	100	7,570	7,125	6,425	5,650	..	7,300	7,475	6,450	6,925	..	7,675	7,225	7,050	7,450	..
Number of failures to predict	1	1	7	0	....	0	2	4	1	..	0	0	7	1	..	0	0	5	1	..
Number of predictions.....	89	89	83	90	2	90	88	86	89	..	90	90	83	89	..	90	90	85	89	..
Percentage of verifications..	79.214	86.518	82.229	69.167	50	84.111	80.963	74.709	63.483	..	81.111	83.055	77.711	77.809	..	85.277	80.287	82.941	83.708	..
Percentage of failures	.0111	.0111	.0777	0	...	0	.0222	.0444	.0111	..	0	0	.0777	.0111	..	0	0	.0555	.0111	..

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PERCENTAGE OF VERIFICATION OF PROBABILITIES.

No. 3.—*For September*, 1874.

September, 1874.	Upper Mississippi Valley.					Lower Missouri Valley.					The Northwest.					Pacific States.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
1	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	....	....	....	....	....
	75	50	——	50	....	75	100	——	100	....	100	100	——	100	....	....	....	....	....	....
	75	100	——	100	....	75	100	——	100	....	100	100	——	100	....	....	....	....	....	....
2	25	100	——	100	....	75	100	100	100	....	75	100	100	100	....	....	....	....	....	....
	50	100	75	100	....	50	75	100	100	....	75	50	50	75	....	....	....	....	....	....
	75	75	75	75	....	50	25	50	50	....	100	25	25	50	....	....	....	....	....	....
3	100	75	100	75	....	75	25	100	25	....	100	25	100	50	....	....	....	....	....	....
	50	75	100	——	....	25	75	100	——	....	50	100	100	——	....	....	....	....	....	....
	25	75	75	100	....	50	100	100	100	....	50	100	75	100	....	....	....	....	....	....
4	25	100	50	100	....	75	100	100	100	....	75	100	100	100	....	....	....	....	....	....
	0	50	100	100	....	0	100	100	100	....	0	100	100	100	....	....	....	....	....	....
	100	100	100	75	....	100	100	100	100	....	100	100	100	100	....	....	....	....	....	....
					....					....	100	100	100	100	....	....	....	....	....	....
5	100	50	100	25	....	50	100	100	50	....	75	50	100	100	....	....	....	....	....	....
	100	100	100	50	....	100	100	100	50	....	100	100	100	75	....	....	....	....	....	....
	75	100	100	50	....	75	100	100	75	....	75	100	100	100	....	....	....	....	....	....
6	100	100	100	50	....	100	100	100	50	....	100	100	100	100	....	....	....	....	....	....
	50	100	100	50	....	50	100	100	25	....	50	100	100	50	....	....	....	....	....	....
	100	100	100	50	....	100	100	100	25	....	100	100	100	25	....	....	....	....	....	....
7	0	100	100	25	....					....	25	100	100	0	....	....	....	....	....	....
	100	100	100	100	....	75	100	100	75	....	100	100	100	25	....	....	....	....	....	....
					....	75	75	100	100	....	100	50	100	50	....	....	....	....	....	....
8	75	75	0	100	....	100	50	50	100	....	100	50	50	100	....	....	....	....	....	....
	25	100	100	100	....	100	50	100	100	....	100	100	100	100	....	....	....	....	....	....
	25	100	100	100	....	100	100	100	100	....	100	75	100	100	....	....	....	....	....	....
9	100	100	100	0	....	75	100	100	25	....	75	50	75	0	....	....	....	....	....	....
	50	100	50	50	....	100	100	50	100	....	50	50	50	100	....	....	....	....	....	....
	75	50	75	50	....	100	50	100	0	....	75	50	100	75	....	....	....	....	....	....
10	75	100	100	100	....	50	100	100	100	....	25	50	75	100	....	....	....	....	....	....
	50	75	——	25	....	50	75	——	100	....	25	100	——	50	....	....	....	....	....	....
	100	100	100	25	....	100	75	75	50	....	100	50	50	50	....	....	....	....	....	....
11	100	25	0	50	....	100	25	0	0	....	100	50	25	50	....	....	....	....	....	....
	75	100	100	100	....	75	100	100	100	....	100	100	100	100	....	....	....	....	....	....

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PERCENTAGE OF VERIFICATION OF PROBABILITIES—Continued.

No. 3.—*For September*, 1874.

September, 1874.	Upper Mississippi Valley.					Lower Missouri Valley.					The Northwest.					Pacific States.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
12	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....	....	....	....	....	....
	75	75	100	100	....	75	50	100	100	....	100	25	100	100	....	....	....	....	....	....
	100	100	100	0	....	100	100	100	0	....	100	100	100	0	....	....	....	....	....	....
13	100	100	100	100	....	50	100	100	100	....	100	100	100	100	....	....	....	....	....	....
	100	25	50	50	....	100	25	25	50	....	100	100	25	25	....	....	....	....	....	....
	100	25		50	....	75	25		25	....	75	0		25	....	....	....	....	....	....
14	100	75	100	75	....	75	50	100	25	....	50	50	100	50	....	....	....	....	....	....
	100	75	75	100	....	100	75	25	75	....	100	25	50	50	....	....	....	....	....	....
	100	75	100	100	....	100	25	100	50	....	100	25	100	25	....	....	....	....	....	....
15	100	50	50	100	...	100	75	25	100	....	100	75	0	50	....	....	....	....	....	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	....	....	....	....	....
	100	100	100	100	....	75	100	75	100	....	75	100	75	100	....	....	....	....	....	....
16	100	100	100	100	....	100	100	75	100	....	100	100	100	100	....	....	....	....	....	....
	100	100	100	100	....	100	100	100	75	....	100	100	100	100	....	....	....	....	....	....
	50	100	75	100	....	100	50	50	50	....	100	75	25	75	....	....	....	....	....	....
17	100	100	100	100	....	100	75	50	50	....	100	50	0	50	....	....	....	....	....	....
	0	50	75	100	....	25	75	100	100	....	25	100	100	50	....	....	....	....	....	....
	0	25	100	0	...	25	50	75	50	....	25	25	100	50	....	....	....	....	....	....
18	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....	....	....	....	....	....
	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	....	....	....	....	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	....	....	....	....	....
19	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	....	....	....	....	....
	100	100	100	100	....	75	50	25	100	....	100	75	100	100	....	....	....	....	....	....
	100	75	100	0	....	75	75	100	100	....	100	75	100	100	....	....	....	....	....	....
20	100	100	100	100	....	50	75	100	100	....	100	100	100	100	....	....	....	....	....	....
	100	100	100	50	....	75	100	100	100	...	100	100	100	100	....	....	....	....	....	....
	100	75	100	100	....	75	50	100	100	...	75	50	100	100	....	....	....	....	....	....
21	100	100	100	100	....	100	75	100	100	....	100	75	100	100	....	....	....	....	....	....
	25	100	100	100	....	0	100	100	100	....	0	100	100	100	....	....	....	....	....	....
	100	100	50	100	....	100	100	25	75	....	100	100	0	50	....	....	....	....	....	....
22	100	75	25	100	....	100	75	50	50	....	100	75	50	50	....	....	....	....	....	....
	100	25	100	100	....	100	50	100	100	....	100	50	100	100	....	....	....	....	....	....
	100	50	100	100	....	100	100	100	100	....	100	75	100	75	....	....	....	....	....	....

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23	100	75	100	50	....	100	100	100	100	....	100	75	100	75	....	....	....	....	....	....
	50	100	50		....	50	100	100		....	0	100	100		....	....	....	....	....	....
	100	50	100	100	....	100	75	100	100	....	100	75	100	100	....	....	....	....	....	....
24	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	....	....	....	....	....
	100	100	100	100	....	100	100	75	100	....	100	50	25	100	....	....	....	....	....	....
	25	100	100	100	....	50	100	100	100	....	75	100	100	100	....	....	....	....	....	....
25	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	....	....	....	....	....
	75	50	50	100	....	25	25	50	100	....	75	25	0	100	....	....	....	....	....	....
	100	100	0	100	....	100	100	0	100	....	100	100	0	100	....	....	....	....	....	....
26	75	100		100	....	100	100	100	100	....	100	100	100	100	....	....	....	....	....	....
	75	100	100	50	....	100	100	100	75	....	100	100	100	100	....	....	....	....	....	....
	50	100	0	100	....	100	100	50	100	....	100	100	50	100	....	....	....	....	....	....
27	75	100	100	100	....	100	75	50	100	....	100	100	75	100	....	....	....	....	....	....
	100	100	100	75	....	100	50	100	50	....	100	75	100	75	....	....	....	....	....	....
	100	100	100	100	....	100	100	100	50	....	100	100	100	50	....	....	....	....	....	....
28	100	100	100	100	....	100	100	100	25	....	100	100	100	75	....	....	....	....	....	....
	100	25	50	25	....	100	50	50	75	....	100	25	0	50	....	....	....	....	....	....
	100	100	75	100	....	100	100	50	100	....	100	100	100	100	....	....	....	....	....	....
29	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....	....	....	....	....	....
	100	100	100	50	....	100	0	75	50	....	100	25	100	0	....	....	....	....	....	....
	100	100	100	75	....	100	50	100	25	....	100	50	100	0	....	....	....	....	....	....
30	100	100	50	100	....	100	100	75	100	....	100	100	100	100	....	....	....	....	....	....
	100	50	100	50	....	100	75	75	50	....	100	25	25	25	....	....	....	....	....	....
	100	25	50	100	....	100	25	0	25	....	100	50	0	50	....	....	....	....	....	....
Total percentages	7,125	7,425	7,025	6,875	....	7,300	7,000	6,975	6,700	....	7,775	6,900	6,975	6,750	....	....	....	....	....	....
Number of failures to predict	2	1	8	4	....	2	2	6	4	....	0	0	4	2	....	....	....	....	....	....
Number of predictions	88	89	82	86	....	88	88	84	86	....	90	90	86	88	....	....	....	....	....	....
Percentage of verifications	80.965	83.428	85.671	79.941	....	82.953	79.545	83.033	79.905	....	86.390	76.666	81.103	76.603	....	....	....	....	....	....
Percentage of failures	.6222	.0111	.0888	.0444	....	.0222	.0222	.6666	.0444	....	0	0	.0444	.0222	....	....	....	....	....	....

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PERCENTAGE OF VERIFICATION OF PROBABILITIES.

No. 4.—For September, 1874.

	Percentages of -					Verifications.		Percentage of failures to predict.									
	Weather.	Wind, direction.	Temperature.	Barometer.	Specials.	Totals, (except specials.)		Weather.	Wind, direction.	Temperature.	Barometer.	Total.	Weather.	Wind, direction.	Temperature.	Barometer.	
New England	91.388	84.444	82.558	78.448	50		84.2095	0	0	.0444	.0333	.0194					
Middle States	84.727	80.833	81.547	79.261	0		81.5920	0	0	.0666	.0222	.0222					
South Atlantic States	83.888	84.943	79.464	73.611			80.4765	0	.0222	.0666	0	.0222					
Eastern Gulf States	84.831	87.500	85.119	71.629	0		82.2697	.0111	0	.0666	.0111	.0222					
Western Gulf States	79.214	86.518	82.229	69.167	50		79.2820	.0111	.0111	.0777	0	.0249					
Tennessee and Ohio Valley	84.111	80.963	74.709	63.483			75.8165	0	.0222	.0444	0	.0166					
Lower Lake Region	81.111	83.055	77.711	77.809			79.9215	0	0	.0777	.0111	.0222					
Upper Lake Region	85.278	80.287	82.941	83.708			83.0535	0	0	.0555	.0111	.0166					
Upper Mississippi Valley	80.985	83.428	85.671	79.941			82.5012	.0222	.0111	.0888	.0444	.0416					
Lower Missouri Valley	82.953	79.545	83.033	79.905			81.3590	.0222	.0222	.0666	.0444	.0388					
Northwest	86.390	76.666	81.103	76.703			80.2155	0	0	.0444	.0222	.0166					
Total	924.85	908.18	896.08	833.66			890.6969					.2633					
Percentages	84.078	82.562	81.462	75.788			80.9724					.0239					

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PAPER 30.

List of Agricultural Societies which, on September 30, 1874, had appointed permanent committees to confer with the Chief Signal-Officer of the Army.

Name of Organization and State.	Committee.	Post-office address.
Monroe County Agricultural Society, Indiana.	T. H. Mallow	Bloomington, Ind.
Muskingum County Agricultural Society, Ohio.	R. S. Mershon	Zanesville, Ohio.
Louisville and Jefferson Counties Agricultural Society, Kentucky.	L. Young	Louisville, Ky.
Schuyler County Agricultural and Mechanical Society, Missouri.	John B. Glaze	Glenwood, Mo.
Highland County Agricultural Society, Ohio.	J. S. Bell	Hillsboro', Ohio.
	J. W. Ellis	
Arkansas State Agricultural and Mechanical Society, Arkansas.	Albert Cohen	Little Rock, Ark.
Bertie County Agricultural Society, North Carolina.	S. J. Wheeler	Windsor, N. C.
	J. B. Cheney	Do.
	D. E. Tayloe	Do.
Geauga County Agricultural Society, Ohio.	Dexter Witter	Burton, Ohio.
	George H. Ford	Do.
	Luther Russell	Do.
Otsego County Agricultural Society, New York.	G. Pomeroy Keese	Cooperstown, N. Y.
	H. M. Hooker	Do.
	Elisha Finney	Do.
Crawford County Agricultural Society, Pennsylvania.	A. P. Foster	Conneautville, Pa.
	Col. F. Manton	Do.
	Prof. W. H. Armstrong	Do.
Berrien County Agricultural Society, Michigan.	J. B. Fitzgerald	Niles, Mich.
	D. O. Woodruff	Do.
	William Bort	Do.
Greene County Agricultural Society, Missouri.	Dr. J. E. Tafft	Springfield, Mo.
	A. W. McPherson	Do.
	Rev. J. E. Worth	Do.
Tolland County Agricultural Society, Connecticut.	George H. Kingsbury	Rockville Conn.
	J. C. Hammond, jr.	Do.
Burlington County Agricultural Society, New Jersey.	G. C. Brown	Mount Holly, N. J.
	M. S. Pancoast	Do.
	James Lippincott	Do.
Agricultural and Mechanical Society of Western Alabama, Alabama.	W. S. Bird	Eutaw, Ala.
	H. G. Webb	Do.
	A. T. Lupton	Tuscaloosa, Ala.
Crawford County Agricultural Society, Ohio.	G. Keller	Bucyrus, Ohio.
	E. R. Reamley	
	H. M. Scroggs	
	Josiah Koller	
Saratoga County Agricultural Society, New York.	R. S. Robinson	Greenville Centre, N. Y.
Martin County Agricultural Society, Minnesota.	H. A. Munger	Fairmount, Minn.
California State Board of Agriculture, California.	J. N. Hoag	Sacramento, Cal.
	C. F. Reed	Do.
	F. M. Logan	Do.
Macon County Fruit-Growers' Association, Illinois.	Prof. E. A. Gastman	Decatur, Ill.
	Theo. Hildebrandt	
	J. B. R. Sherrick	
Missouri State Board of Agriculture, Missouri.	John H. Tice	Saint Louis, Mo.
	Rev. Charles Peabody	Do.
	Hon. G. W. Kinney	Snow Hill, Mo.
Jackson County Agricultural Society, Ohio.	Davis Mackley	Jackson Court-House, O.
	J. E. Ferree	Do.
	Jacob Dungan	Do.
Pike County Agricultural Society, Georgia.	J. S. Pope	Zebulon, Ga.
	J. H. Mitchell	Do.
	H. Green	Do.

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List of agricultural societies, &c.—Continued.

Name of organization and State.	Committee.	Post-office address.
Greene County Agricultural Society, New York.	A. P. Jones	Catskill, N. Y.
	G. C. Mott	Do.
York County Agricultural Society, Pennsylvania.	John Evans	York, Pa.
	G. A. Heckert	Do.
	W. S. Roland	Do.
Allamakee County Agricultural Society, Iowa.	Hon. Charles Paulk	Waukon, Iowa.
	A. M. May	Do.
	D. W. Read	Do.
Bay State Horticultural Society of California, California.	F. A. Miller	San Francisco, Cal.
	Prof. H. N. Bolender	San Francisco, Cal.
Maine Board of Agriculture, Maine	M. C. Feruald	Orono, Me.
	Prof. G. L. Goodale	Bowdoin College, Brunswick, Me.
	Prof. C. E. Hamlin	Colby University, Waterville, Me.
	C. T. Brackett	Bowdoin College, Brunswick, Me.
	Hon. S. F. Perley	Naples, Me.
Tuscola County Agricultural Society, Michigan.	C. C. Stoddard	Caro, Mich.
	Townsend North	Do.
	Dr. William Johnson	Do.
Central Iowa District, Agricultural Association, Iowa.	P. H. Bristow	Des Moines, Iowa.
	M. W. Robinson	Do.
	D. V. Cole	Do.
South Carolina Agricultural and Mechanical Society, South Carolina.	Dr. F. P. Porcher	Charleston, S. C.
	Dr. T. T. Roberteon	Winnsborough, S. C.
	Col. J. P. Thomas	Columbia, S. C.
Connecticut State Agricultural Society, Connecticut.	Hon. E. H. Hyde	Stafford, Conn.
	Hon. Thos. H. Butler	Norwalk, Conn.
	H. S. Collins	Collinsville, Conn.
Connecticut State Board of Agriculture, Connecticut.	Prof. W. H. Brewer	New Haven, Conn.
	W. H. Yeomans	Columbia, Conn.
	T. S. Gold	West Cornwall, Conn.
Terre Haute Horticultural Society, Indiana.	Joseph Gilbert	Terre Haute, Ind.
	J. F. Soule	Do.
	John Weir	Do.
	Rev. — Stimson	Do.
Middlesex County Farmers' Club, New Jersey.	G. H. Lambert	New Brunswick, N. J.
	G. W. Thompson	Do.
Farmers' Club, Beaver City, Utah	D. Tyler	Beaver City, Utah.
	Wm. Fotheringham	Do.
	J. L. Smith	Do.
Indiana State Board of Agriculture, Indiana.	T. C. Johnson	New Albany, Ind.
	Thomas Dowling	Terre Haute, Ind.
	J. D. G. Nelson	Fort Wayne, Ind.
Rhode Island Society for the Encouragement of Domestic Industry, Rhode Island.	Dr. J. W. Sawyer	Providence, R. I.
	J. T. Smith	Do.
	Dr. W. F. Channing	Do.
Washington County Agricultural Society, New York.	M. Ingalsbe	South Hartford, N. Y.
	R. W. Pratt	Do.
Farmers and Fruit-Growers' Association of Illinois, Illinois.	D. W. West	Belleville, Ill.
	F. H. Pieper	Do.
	E. W. West	Do.
Iowa State Horticultural Society, Iowa.	Prof. Charles E. Bessey	State Agricultural College, Ames, Iowa.
	Hon. John Scott	Nevada, Iowa.
	G. B. Brackett	Denmark, Iowa.
Addison County Agricultural Society, Vermont.	Prof. E. Brainerd	Middlebury College, Middlebury, Vt.
	Prof. W. H. Parker	Do.
	Prof. H. M. Seely	Do.
Orleans County Agricultural and Mechanical Society, Vermont.	D. M. Camp	Newport, Vt.
	T. H. Haskins	Do.
	Z. E. Jameson	Irasburgh, Vt.

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List of agricultural societies, &c.—Continued.

Name of organization and State.	Committee.	Post-office address.
Bradley County Agricultural Society, **Tennessee.**	T. L. Cate	Cleveland, Tenn.
	J. C. Morgan	Do.
	Dr. G. A. Long	Do.
Iowa State Agricultural Society, **Iowa.**	Peter Melendy	Cedar Falls, Iowa.
	S. B. Hewitt, jr	Eagle Grove, Iowa.
	J. M. Shaffer	Fairfield, Iowa.
Carroll and Choctaw Counties Agricultural Society, Mississippi.	A. M. Rafter	Winona, Miss.
	T. J. Blackmoore	Do.
	O. J. Moore	Do.
Belmont Farmers' Club, Mississippi.	A. M. Rafter	Winona, Miss.
	W. W. Dabney	Do.
	James Thompson	Do.
Broome County Agricultural Society, **New York.**	E. G. Crafts	Binghamton, N. Y.
	T. F. Roberts	Do.
	Arch. Stone	Do.
	P. Van Vredenberg	Do.
Bureau County Agricultural Society, **Illinois.**	George W. Stone	Princeton, Ill.
	A. Bryant, jr	Do.
	H. L. Baltwood	Do.
Essex County Agricultural Society, **Massachusetts.**	Charles P. Preston	Danvers, Mass.
	William Sutton	Salem, Mass.
	A. N. Dodge	Do.
Kokomo Horticultural Society, **Indiana.**	L. J. Templin	Kokomo, Ind.
	L. W. Leach	Do.
	C. S. Boggs	Do.
Jo Daviess, La Fayette, and Stephenson Union Agricultural Society, **Illinois.**	A. M. Jones	Warren, Ill.
Marshall County Agricultural Society, Iowa.	Byron Webster	Marshalltown, Iowa.
	John Turner	Do.
	S. P. Kinsley	Do.
Coles County Agricultural Society, **Illinois.**	D. C. M. Evans	Charleston, Ill.
	Charles Penatel	Do.
Rock County Agricultural Society, **Wisconsin.**	Dr. J. B. Whiting	Janesville, Wis.
Waupaca Agricultural Society, Wisconsin.	H. C. Mead	Waupaca, Wis.
	W. Scott	Do.
	E. Cooledge	Do.
Ingham County Agricultural Society, **Michigan.**	Allen Rowe	Mason, Mich.
	A. M. Chapin	Eden, Mich.
	William Rayner	Mason, Mich.
Fillmore and Mower Counties Agricultural Society, Minnesota.	Dr. A. T. Whitman	Spring Valley, Minn.
	H. S. Hart	Do.
	W. L. Kellogg	Do.
	B. F. Farmer	Do.
	William McNee	Do.
	E. S. Bumstead	Do.
	George W. Farmer	Do.
	W. Allen	Do.
	D. Rathbun	Do.
Marion County Agricultural Society, **Ohio.**	H. M. Ault	Marion, Ohio.
	H. A. True	Do.
	J. K. Newcomer	Do.
Humphreys County Farmers' Club, **Tennessee.**	Rev. A. A. Wilson	Waverly, Tenn.
	T. U. Harris	Do.
	W. A. Hollinger	Do.
	A. R. Lankford	Johnsville, Tenn.
Luzerne County Agricultural Society, **Pennsylvania.**	Steuben Jenkins	Wyoming, Pa.
	Rev. Abel Parker	Do.
	Dr. J. M. Lewis	Do.
	Dr. J. B. Crawford	Wilkesbarre, Pa.
	Dr. C. R. Gorman	Pittston, Pa.
	Dr. B. H. Throop	Scranton, Pa.
	Dr. R. H. Tubbs	Kingston, Pa.

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List of agricultural societies, &c.—Continued.

Name of organization and State.	Committee.	Post-office address.
Atlanta Union Central Agricultural Society, Illinois.	S. D. Fisher	Atlanta, Ill.
	William P. Hunt	Do.
	Daniel McFarland	McLean, Ill.
Howard County Agricultural Society, Iowa.	H. D. Noble	Cresco, Iowa.
	Stephen Rodford	Chester, Iowa.
	C. S. Thurber	Cresco, Iowa.
Outagamie County Agricultural Society, Wisconsin.	W. H. P. Bogan	Appleton, Wis.
	Edwin Nye	Freedom, Wis.
	N. B. Clark	Ellington, Wis.
	Louis Perrott	Greenville, Wis.
Lawrence County Agricultural and Industrial Association, Ohio.	Dr. G S. B. Hempstead	Hanging Rock, Ohio.
	Cyrus Ellison	Ironton, Ohio.
	Hiram Campbell	Do.
	H. W. Gillett	Quaker Bottom, Ohio.
	Samuel Burke	Arabia, Ohio.
Miami County Agricultural Society, Ohio.	W. W. Crane	Tippecanoe City, Ohio.
Michigan State Pomological Society, Michigan.	A. T. Linderman	Grand Rapids, Mich.
	C. L. Whitney	Muskegon, Mich.
	Edward Bradfield	Ada, Mich.
Lamoille County Agricultural Society, Vermont.	George Wilkins	Stowe, Vt.
	H. H. Powers	Morrisville, Vt.
	G. L. Waterman	Hyde Park, Vt.
Sheboygan County German Agricultural and Trades Association, Wisconsin.	Ferdinand Stoesser	Sheboygan, Wis.
	Frederick Must	Do.
	Fred. Zimmerman	Do.
	Albert Mohlendorf	Do.
	Thomas Blackstock	Do.
Walworth County Agricultural Society, Wisconsin.	Peter Golder	Elk Horn, Wis.
	David Williams	Darien, Wis.
	Charles E. Buhre	Geneva, Wis.
Floyd County Agricultural Society, Iowa.	E. C. Chapin	Charles City, Iowa.
Edgar County Agricultural Society, Illinois.	Walter Booth	Paris, Ill.
	B. Halcomb	Do.
	D. P. Elliott	Do.
Perry County Agricultural and Mechanical Association, Indiana.	I. F. Patterson	Rome, Ind.
	I. I. Wheeler	Do.
	Ad. Ackerman	Do.
Davis County Agricultural Society, Iowa.	Howard Willey	Bloomfield, Iowa.
	William J. Hamilton	Do.
	T. A. Walker	Do.
	A. Rankin	Belknap, Iowa.
	William Hill	Bloomfield, Iowa.
Utah County Agricultural and Home Manufacturing Society, Utah.	Hon. George Bean	Provo, Utah.
	C. D. Evans	Springville, Utah.
	Daniel Graves	Provo, Utah.
Ontario County Agricultural Society, New York.	Cooper Sayre	Oak's Corners, N. Y.
	John S. Coe	Canandaigua, N. Y.
Washington County Agricultural and Mechanical Association, Virginia.	Rev. George R. Barr	Abingdon, Va.
	J. L. White	Do.
	Thomas Cosby	Do.
Otoe County Agricultural Society, Nebraska.	J. W. Pearman	Nebraska City, Nebr.
	W. W. Wardell	Do.
Lake County Agricultural Society, Ohio.	D. W. Mead	Painesville, Ohio.
	C. C. Jennings	Do.
	George Blish	Do.
Page County Agricultural Society, Iowa.	S. H. Kiddlebaugh	Clorinda, Iowa.
	S. W. Petterson	Do.
	J. L. Barrett	Do.
King's Creek Valley Farmers' Club, Ohio.	Thomas Cowgill	Kennard, Ohio.
Cerro Gordo County Agricultural Society, Iowa.	George R. Miller	Mason City, Iowa.
	T. G. Emsley	Do.

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List of agricultural societies, &c.—Continued.

Name of organization and State.	Committee.	Post-office address.
Cerro Gordo County Agricultural Society, Iowa—Continued.	A. Wilson	Owen's Grove, Iowa.
	Henry Martin	Mason City, Iowa.
	C. W. Tenney	Plymouth, Iowa.
Northumberland County Agricultural Society, Pennsylvania.	Dr. E. H. Horner	Turbotville, Pa.
	William A. Dean	Do.
	Thomas Barr	Do.
Johnson County Agricultural and Mechanical Association, Kansas.	John M. Giffen	Olathe, Kans.
	Henry McBride	Do.
	J. M. Hadley	Do.
Albany County Agricultural and Industrial Society, New York.	Hon. Geo. A. Tweddle	Albany, N. Y.
	J. Winne	Bethlehem Centre, N. Y.
	J. H. Farrell	Albany, N. Y.
Pike County Agricultural Sociey, Mississippi.	M. D. Pound	Magnolia, Miss.
Warren County Agricultural Society, New York.	Charles W. Osborn	Warrensburgh, N. Y.
Shenandoah Valley Agricultural Society, Virginia.	Edmund Pendleton	Winchester, Va.
	Dr. W. J. Best	Brucetown, Va.
	J. C. Baker	Winchester, Va.
	Jarvis Jennings	Millwood, Va.
	Edwin S. Baker	Winchester, Va.
Wabaunsee County Central Agricultural Society, Kansas.	William Coleman	Eskridge, Kan.
	William Rinehart	Do.
	George Reynolds	Do.
Oswego County Agricultural Society, New York.	Henry L. Davis	Oswego, N. Y.
	P. M. Newton	Sandy Creek, N. Y.
	Hiram Walker	Union Square, N. Y.
	Thomas H. Austin	New Haven, N. Y.
	Henry Palmer	Paris, N. Y.
Tennessee Central Fair Association, Tennessee.	W. P. Henderson	Murfreesborough, Tenn.
Jersey County Agricultural Society, Illinois.	Dr. J. O. Hamilton	Jerseyville, Ill.
	George H. Jackson	Do.
	William Shepard	Do.
Steuben County Agricultural Society, New York.	R. E. Robie	Bath, N. Y.
Watonwan County Agricultural Society, Minnesota.	W. W. Murphy	Medelia, Minn.
Moultrie County Agricultural and Horticultural Society, Illinois.	G. W. Vaughan	Sullivan, Ill.
	E. W. Mills	Do.
Rome Agricultural and Mechanical Fair Association, Georgia.	Thomas J. Perry	Rome, Ga.
	Thos. W. Alexander	Do.
West Virginia Central Agricultural and Mechanical Society, Virginia.	Lee Haymond	Clarksburgh, W. Va.
	R. T. Lowndes	Do.
	Thomas S. Spates	Do.
	Dr. W. M. Late	Brideport, W. Va.
	Henry Bassell	Brown's Creek, W. Va.
Hall County Agricultural Society, Georgia.	Dr. M. Stephenson	Gainesville, Ga.
	J. E. Redwine	Do.
Portage County Agricultural Society, Ohio.	H. Y. Beebe	Ravenna, Ohio.
	E. R. Wart	Do.
	John Meharg	Do.
Chickasaw County Agricultural Society, Iowa.	L. J. Young	Chickasaw, Iowa.
	H. M. Mixer	New Hampton, Iowa.
	Buel Sherman	Fredericksburgh, Iowa.
Virginia State Agricultural Society, Virginia.	F. G. Ruffin	Richmond, Va.
	Col. William C. Knight	Do.
	Dr. Wm. T. Walker	Dover Mines, Goochland, Va.
Agricultural and Mechanical Society of Alleghany County, of Maryland, West Virginia and Pennsylvania.	Charles C. Shriver	Cumberland, Md.
	J. B. H. Campbell	Do.
	R. L. Gross	Do
Central Farmers' Club, Delaware	M. Hayes	Dover, Del.
	J. H. Bateman	Do.
	C. H. B. Day	Do.

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List of agricultural societies, &c.—Continued.

Name of organization and State.	Committee.	Post-office address.
Madison County Agricultural Society, Indiana.	I. R. Holston	Anderson, Ind.
	William Crun	Do.
	James Halzlett	Do.
	M. G. Walker	Pendleton, Ind.
	N. G. Tomlinson	Alexandria, Ind.
	Thomas Beckworth	Perkinsville, Ind.
Convention of Pomologists, Michigan.	H. S. Clubb	Grand Haven, Mich.
	Samuel B. Peck	Muskegon, Mich.
	C. L. Whiting	Do.
State Pomological and Horticultural Society of Michigan, Michigan.	W. K. Kedzie	Lansing, Mich.
Champaign County Agricultural Society, Ohio.	W. A. Humes	Urbana, Ohio.
Buchanan County Agricultural Society, Iowa.	Lyman J. Curtis	Independence, Iowa.
	Dr. George Worne	Do.
	Jed. Lake	Do.
New Hampshire State Agricultural Society, New Hampshire.	Hon. Samuel N. Bell	Manchester, N. H.
	Hon. Frederick Smyth	Do.
	Gen. Nathaniel Head	Hooksett, N. H.
Republic County Agricultural Society, Kansas.	O. A. A. Gardner	Belleville, Kans.
Doylestown Farmers' Club, Pennsylvania.	T. W. Trego	Doylestown, Pa.
	H. T. Darlington	Do.
	D. E. Brower	Do.
Franklin County Agricultural Society, Maine.	D. H. Knowlton	Farmington, Me.
	L. F. Green	East Wilton, Me.
	P. P. Tufts	Farmington, Me.
Oxford County Agricultural Society, Maine.	Howard D. Smith	Norway, Me.
	A. C. T. Smith	South Paris, Me.
Iowa County Agricultural Society, Iowa.	J. Root, jr	Marengo, Iowa.
	J. C. Clark	Foote, Iowa.
	A. H. Simpson	Victor, Iowa.
Ephratah Agricultural and Scientific Society, Pennsylvania.	W. H. Spera	Ephratah, Pa.
Warsaw Horticultural Society, Illinois.	B. Whitaker	Warsaw, Ill.
	J. W. Hollowbush	Do.
	Charles Hay	Do.
State Grange of Patrons of Husbandry, South Carolina.	John B. Moore	Edgefield, S. C.
	D. W. Aiken	Cokesbury, S. C.
	Benjamin Allston	Georgetown, S. C.
Illinois State Board of Agriculture, Springfield, Illinois.	Jonathan Pariam	Springfield, Ill.
	William H. Russell	Do.
	A. M. Garland	Do.
Fayette County Agricultural Society, West Union, Iowa.	Frank McClintock	West Union, Iowa.

PAPER 31.

WASHINGTON, D. C., *September* 26, 1874.

GENERAL: The following is submitted as my report upon the Mississippi River, in connection with the establishment by you of a "danger-line" to life and property along its entire extent. In carrying out your instructions as regards the collection of such information as may be of value in forecasting rises, and for other kindred purposes, great care has been used in placing before you such data only as appear reliable.

It is a matter of regret that time has been lacking in which to more carefully prepare the appendices, and properly arrange and elaborate my report.

Although my orders carried me only as far north as Le Claire, Iowa, it was thought requisite to a proper elucidation of the question to collate as many data as possible in regard to the upper river.

Gauge-readings at Saint Paul for six years show the following stages of the river: During January, February, most of March, and December, the river is closed by ice.

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Breaking up late in March, the river during early April uniformly rises, generally reaching its maximum yearly height, and falls gradually late in the month. During May it remains at a stand, or gradually falls. June and July the fall continues slowly, with slight fluctuations. In August it is generally at a stand, followed by a very gradual fall, which extends through September.

October at a stand, and gradual fall, generally reaching its lowest mean stage during that month.

November, generally at a stand, with light rise at the end of the month and commencement of December, closing by ice early in the latter month.

Owing to the peculiar formation of the banks at Saint Paul, no damage has been done to the city, but the rise overflows considerable ground in the bottom-lands between the city and La Crosse. Fourteen feet and six inches is fixed on as the point at which water commences to damage the crops and houses in the lower grounds. The water has exceeded this height as follows: 1867, April, eight days; June, thirteen days; and July, sixteen days; 1869, April, one day; September, eleven days; and October, four days; 1873, April, nine days; May, two days; and June twelve days. The gauge-records at Rock Island indicate that similar height was reached during 1861, 1862, and 1870.

The lowest water is stated to have occurred in 1861, with 2 feet in channel, and the highest in 1850, it then standing 21.85 feet above low water.

From an examination of the Rock Island records, it is evident that low water must have occurred in 1864, the water standing 1.15 feet lower in 1864 than 1861, and averaging for September 0.83 foot below the lowest water of 1861.

General Warren's observer also used low water of 1864 as zero. The high water of the Upper Mississippi is placed by steamboat-men in 1851 or 1852; 1851 is doubtless the year, as the water reached a height at Saint Louis that year only surpassed by 1844.

At Prescott the Saint Croix River empties into the Mississippi, and on the west side, as far down as Red Wing, Minn., in 1851, the county was overflowed some six miles inland, and to a depth equal to six or eight feet, opposite Fountain City, Wis.; in that year the country was covered with six feet of water. Winona, Minn., was overflowed, excepting a few squares, and all the low land between that place and Saint Louis was under water.

Concerning La Crosse and Dubuque nothing more is known than that already learned by the office, giving the La Crosse range at 15.50 feet, and Dubuque at 21.83 feet. The range at La Crosse will probably prove greater when a longer record has been obtained. Between La Crosse and Dubuque a considerable portion of bottom-lands must suffer, during unusual floods, in common with other parts of the river. At Clinton, Iowa, the range of water is 19.75 feet, from low water of 1864 to high water of 1870.

At Le Claire, Iowa, owing to its being at the end of Rock Island rapids, the range of the river decreases, being but 13.08 feet. The highest water occurred April, 1870, and the lowest in 1864. Ten feet above zero backs up Wapsipinicon River and damages farms. Eleven feet overflows some roads. Thirteen feet is determined as being the danger-line. Thirteen and a half would carry away four flouring-mills, located in and near the town. Twelve feet has been reached only twice since 1857, twelve feet two inches in 1862, and thirteen feet one inch in 1870. The subject of interest at Le Claire is low, and not high water, as navigation suffers seriously from low water. From this point to Davenport, fifteen miles below, pilots are invariably used, owing to the nature of the channel, the great slope causing shallow water during the most of the year.

At low water in 1864, there were 22 inches on "Campbell's chain," and 21 inches on "Rock Island chain," of the rapids. Both have been improved, and at zero there is probably 24 inches on the shallowest chain of the rapids. At Davenport, the foot of the Rock Island rapids, observations for fifteen years have been taken, and they give an exceedingly good mean of the river.

These observations are incorporated in this report, having been obtained through the courtesy of Gen. John N. Macomb, United States Engineer Corps. Nine years are reduced from a hydrograph, and there may be chance errors, but certainly not enough to effect the general means.

At Rock Island the river generally falls until near the end of February, when a rise follows, continuing until the middle of March. From then until the middle of April, sharp rises and falls occur, the rise prevailing and continuing to about the middle, the maximum of the year usually occurring between April 23 and May 15.

The river generally falls from the maximum to the end of September, when occasional rises are followed by a falling river to the middle of December, when a rise follows for the rest of the year. The range of the water is 16.96 feet, from 0.25 foot below zero in November, 1864, to 16.71 feet above in April, 1870.

Ice-gorges are frequent in the late winter, and the water rises very high at such times for several hours, doing or threatening considerable damage. On March 10, 1868, the water rose at Rock Island bridge, where the gauge is located, from 12.2 feet

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to 20.8 feet, when the gorge broke; 15 feet on the gauge is determined as the danger-line. The water has been above that height seven days in 1862, four days in 1866, and thirteen days in 1870.

Scarcely any damage is done by that amount of water at Davenport, but considerable occurs below. A distillery three miles below Rock Island, in Illinois, discontinued working in 1870, and another foot would have carried the building away. In that year all bottom-land between Davenport and Keokuk was overflowed. At Buffalo, Iowa, part of the town was flooded and a saw-mill was overflowed, and a few inches more of water would have swept it away.

Muscatine, Iowa, was partly overflowed in that year. Of the five mills there located two were flooded and discontinued work, and one the water just reached; two south of the town are on high ground.

Keithsburgh, Ill., was partly flooded, and one saw-mill was overflowed and a grist-mill was barely touched.

At Burlington, Iowa, the range of water is 15.0 feet, the maximum being reached in 1870. The low water is probably that of 1864. In 1870 no great damage was done to the city, only some few buildings being flooded.

At Keokuk, Iowa, the range of water is 21.48 feet, from low water of November, 1873, to high water of 1851.

Owing to the slope of the river and the configuration of the banks no harm comes to Keokuk from any floods. At 14.5 feet the river is liable to injure the Government dams and improvements by back water and washing over. The river has been above this point one day in 1868, one day in 1869, and twenty-seven days in 1870.

The stage of low water at this point is of peculiar interest to the steamboat-men, as during very low water all freight has to be transshipped over the rapids, at the foot of which Keokuk is located.

The low water of 1864 showed 4½ feet in the Keokuk Channel, and 16 inches at the shallowest point on the rapids.

The rise on the rapids is about two-thirds of that experienced at Keokuk. The range of the water is 13 feet in the middle of the rapids against 21.48 feet at Keokuk. Through the courtesy of Major A. Stickney, Corps of Engineers, records of the river at Keokuk from 1868 to date are incorporated in these appendices.

The Des Moines River joins with the Mississippi three miles below Keokuk, and just above Warsaw, Ill. At Warsaw, Ill., there is a range of 21.92 feet from low water November 29, 1873, to high water of 1851. At 18 feet the water overflows some bottom-land, which is increased in extent very considerably by another foot of water. No flood has ever injured the town, which is on a considerable bluff. Alexandria, Iowa, a mile below Warsaw, would suffer considerably from water above 19 feet. The water which would probably do the greatest damage would be a flood from the Des Moines in conjunction with that of the Mississippi, and could scarcely be predicted with accuracy.

At Quincy, Ill., sixty miles below Warsaw, the water ranges from low water 1867 to high water 1851, 20 feet. Damage from high water is suffered only by merchandise on the river-banks. Sixteen feet would probably damage farms and property in the bottom-grounds above and below the city. The water was above this point five days in 1869 and twelve days in 1870. The high water of 1869 appears to have been the result of a freshet from the Des Moines River on the very top of the rise of the Upper Mississippi, and was of very short duration. At Hannibal, Mo., thirty miles below Quincy, the river has a range of 22.25 feet from low water of 1867, and of November 30, 1872, to high water 1851. Eighteen feet probably damages farms and other property in the bottoms, while any sudden rise endangers merchandise on the banks. The water has been above this point in 1851, 4 feet; 1858, 2.5 feet, and very probably in 1869 and 1870. At Louisiana, twenty miles below, the river ranges 20.5 feet from low water 1867 to high water 1851. There is a large area of low land in this vicinity which suffers from overflow at 12 feet 6 inches on the Louisiana gauge. Such stage overflows all but the very highest ridges, which are all overflowed at 18 feet. A levee is now in course of construction, whose level is equal to the high water of 1851, which will protect the greater part of land now inundated. The low portions now have but few houses, and are but little cultivated, being chiefly of value and use as ranges for cattle. Sixty-nine miles below Louisiana is the Illinois River, and twenty-three miles below the Illinois, the Missouri and Mississippi unite. The Missouri affects greatly the Mississippi, as is shown by the range at Saint Louis, which is 41.39 feet, ranging from low water of 1863 to high water of June 1844. This range closely agrees with that of the Missouri, which at Saint Charles is 40 feet, and between the same years. An examination of the records for the past fifteen years shows that during this time the flood of the year has come entirely from the Missouri; eleven years including the very heavy freshets of 1867 and 1870; in 1869 it came from the Des Moines, Illinois, and Missouri; in 1871 from the Illinois and Missouri; and in 1872 from Missouri and upper river.

It seems evident that, with only an ordinary stage of water in the Missouri, no flood from the upper river can create a freshet below the mouth of the Mississippi. In 1862,

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1866, 1867, and 1870 a rise from the upper river k ept the Mississippi at a stand a little below the maximum height for a short time.

At Saint Louis no ordinary flood damages any property except articles of merchandise on the levee by very sudden rises. In 1844, however, a large portion of the most valuable part of the city used for business purposes was overflowed, as is shown by the inclosed map, (Appendix, No. 19,) whereon the submerged district is inclosed by a blue line. The water-works, elevator, depot, and all the tracks of the Iron Mountain Railway to the city boundary are on ground then overflowed. Thirty feet is about the point where the water commences to damage the buildings in the city proper. The water was above that point 10 days in 1862, 46 days in 1851, 59 days in 1844, and a number of days in 1828 and 1845, occurring four times in fifty years, and for a period of about 120 days. From Saint Louis down to the mouth of the Kaskaskia River there is a strip of land subject to overflow in high floods. The country between the Kaskaskia and Mississippi, from Evansville, Ill., south to the junction, is most subject to overflow. The danger-point at Saint Louis is applicable to this point.

Between Cape Girardeau and Commerce is a narrow strip of land, over which, during high water, an immense volume pours into the Saint Francis bottom-lands. The water probably commences running in at 29 feet on the Saint Louis gauge. From this point down the Humphreys and Abbot map has been copied as being the standard authority, and, for convenience of reference, to show the country liable to overflow.

At Cairo, Ill., the junction of the Ohio with the Mississippi increases the range of the river to 51.97 feet from low water of 1871 to high water of 1867.

At 39 feet the water overflows the country gravel road in Kentucky so that wagons cannot use it; 41 feet begins to overflow the country generally; and 45 feet will cover the country from 2 to 10 feet deep from twenty miles up the river down to Columbus, Ky., generally extending three miles back from the river.

The country in rear of Cairo, from Mound City, below Cache River to Commerce, at 40 feet is overflowed. At 47 the water commences to overflow the Missouri side, and is considered as being dangerous to the levees standing around Cairo. The water has been above this height 18 days in 1858, 4 days in 1859, 13 days in 1865, 39 days in 1867, and 8 days in 1874.

The highest water, 51.97 feet, overflowed three-fourths of the country south of Vienna; and from Big Bay Creek to Cache River the strip of country directly east of Cache River over which the Illinois Central runs, Metropolis, and New Liberty were above overflow. The Ohio during lowest stage of water is 12.05 feet deep at Cairo; 6.23 feet at mouth Cache River, and 3.57 feet at Mound City. The depth from Cairo to Memphis is about 5 feet in extreme low water.

The most severe flood from Cairo to Memphis was that of 1867, being at Cairo 17 inches higher than ever before known. Point Pleasant, Mo., which is situated at the foot of the high land known as Big Prairie, was overflowed about a foot in that year.

Osceola, Ark., was overflowed almost completely in 1867, the first stories of the houses being completely under water, as they nearly were in 1874.

All of Pecan Point was submerged in 1867, but a few thousand acres escaped in 1874.

The danger-point for this country on the Cairo gauge is placed at 43 feet. At Memphis 34 feet is the danger-line. Any rise above this point is certain to overflow the Saint Francis country directly opposite Memphis.

The first water in 1874 that troubled the Memphis and Little Rock Railroad was April 23, when the Memphis gauge stood at 34.7 feet. The water stood at or above 34 feet for 27 days in 1858; 42 days in 1859; about 43 days in 1867; 9 days in 1869; 19 days in 1871; and 36 days in 1874.

At Helena the danger-line is 40 feet, above which point the levees of the surrounding country begin to show signs of weakness. The water has stood above this point 72 days in 1858, 87 days in 1859, about 16 days in 1861, —— in 1862, about 60 days in 1867, and 78 days in 1874. The water which has overflowed the banks of the Mississippi at Cape Girardeau and below New Madrid into the Saint Francis Swamp, is here forced back into the river and returns in time to prolong the dangerous stage of water beyond the period it is usually experienced in other localities.

On March 13 Bass Crevasse, just below Lake Providence, 3,000 feet wide and 6 feet deep, formed, the water being 41.60 feet at Helena and 37.10 at Lake Providence. This was followed on March 15, 1874, the water being 41.85 feet at Helena, 41.20 feet at mouth of White River, and 37.20 feet at Lake Providence, by the levee at Bolivar Landing, Bolivar County, Mississippi, about twenty-five miles below White River, which broke, forming a crevasse 1,900 feet wide, which was not closed. Crevasses followed in the order named: On March 20, Cook's Crevasse, Mississippi, four miles above Bolivar Landing, 1,600 feet wide; it was not closed during high water; Hushpuckana, one hundred and forty miles below Helena, April 8; Bell's, Bolivar County, 232 feet wide, not closed April 30; Connelly's, Catfish Point, April 28, 700 feet wide, 3 to 12 feet deep; Ashton, La., date unknown, 17,000 feet wide; Maynard's, 450 feet wide; Miller's, (small,) both near Friar's Point, fifteen miles below Helena, on May 10; Friar's Point, two places, (small,) May 10; Apparson's, above Helena, 200 feet wide, May 18.

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At Jacksonport, Ark., on the White River, the range of water is 33.93 feet from low water of 1872 to high water of 1867. The high water of this year failed to reach the maximum by 2.88 feet. At Little Rock, Ark., on the Arkansas River, the range of water is 32.30 feet, from low water 1872, to high water 1857.

The junction of the Arkansas and White, a few miles from the mouth of the White, pours out their entire flood through that channel, giving the whole rise to the White River gauge.

At mouth of White River the range of the river is slightly increased, being 46.80 feet, from low water of 1872 to high water of 1867.

The water of this year reached to within 0.20 foot of 1867, and probably would have exceeded it but for Hushpuckana and other crevasses. At Lake Providence, Miss., the range is 44.72 feet from low water of 1872 to high water of 1862.

At Vicksburg the range of water is 52.40 feet from low water of 1872 to high water of 1862.

The danger to the levees commences at 41 feet. The water has been above this height 138 days in 1858, 113 days in 1859, in 1862, in 1867, 27 days in 1873, and 90 days in 1874. If the levees were all in good condition the "danger-line" should be one foot higher. The Northern Louisiana and Texas Railway, from Delta to Monroe, ceased running March 16, water on Vicksburg gauge 42.85 feet, being the result of Bass crevasse, fifty miles above.

On March 17, 1874, the water being at 43.05 feet at Vicksburg, the levee opposite Grand Gulf, thirty miles below, broke, forming the Hard Times crevasse, 1,500 feet wide and 5 feet deep.

On March 28, water 44.10 feet at Vicksburg and 41.15 feet at Natchez, Glass Cock's Crevasse, about thirty miles below Natchez, made, 4,000 feet wide and 3 feet deep.

In April, dates unknown, crevasses at Diamond Lake Bend 6,000 feet wide and 8 feet deep; at Buckbridge, above Hard Times, 800 feet wide and 5 feet deep, and at Waterproof, April 17, 2,000 feet wide and 12 feet deep, made between Vicksburg and Red River. During this time the water stood at Vicksburg from 44.10 feet to 46.90 feet.

At Natchez the range of water increases slightly, being 52.70 feet from low water of 1855 to high water of 1859. The "danger-line" is 40 feet. The water has been above this point 143 days in 1851, 220 days in 1858, in 1859, 1862, 1867, 1868, 1869, 1870, 1871, and 69 days in 1874. No injury results to Natchez short of 46 feet, and even then only a few buildings in the lower town are inundated, but damage is done at an earlier stage to levees below the city.

In case the levees were in good condition the "line" would be placed 2 feet higher. That it probably remains thus low is evident from the Glass Cock Crevasse, twenty miles below, 4,000 feet wide and 3 feet deep, which made on March 29, the water height 41.20 feet at Natchez. At Red River Landing the range of the river is 47.05 feet from low water of 1872 to high water of 1874, the range being increased 0.72 foot this year, caused by the unprecedented flood of the Red and Ouachita in conjunction with that of the Ohio River. At Baton Rouge the range of the river is 35.95 feet from low water of 1854 to high water of 1874, being increased this year 0.27 foot from the same causes that produced the extraordinary water at Red River Landing.

The "danger-line" is 29 feet on the gauge at Baton Rouge. The water has been above that point 70 days in 1851, 97 days in 1852, 17 days in 1853, 11 days in 1872, 26 days in 1873, and 90 days in 1874. If the levees were in good condition the "danger-line" would be placed at 30 feet.

The crevasse opposite Port Hudson, thirty miles above, 10,000 feet wide and 4 feet deep, occurred April 5 with 33.73 feet water at Baton Rouge and 40.70 at Red River Landing. McCullom's, 7 feet deep, two miles below Baton Rouge, followed on April 12, 43 feet water at Baton Rouge.

Bonnet Carre Crevasse, 1,600 feet wide and 15 feet deep, occurred April 11, with 42.65 water at Baton Rouge and zero at New Orleans.

On April 16, Grand Levee at Morganza, sixty miles above, broke, the water being at its maximum (44.05 feet) at Red River Landing, and 36.15 feet at Baton Rouge, making a crevasse 6,000 feet wide and 10 feet deep.

Hickey's, 1,800 feet wide and 10 feet deep, opposite Baton Rouge, occurred the same day.

At Carrollton, La., the range of the river is 16.55 feet from low water of 1870 to high water of 1874, by which the range was increased 0.55 foot.

At New Orleans the range is 16.07 feet from low water of 1872 to high water of 1874; the range was this year increased by 0.67 foot.

The danger-line is placed at 2.50 feet below high water of 1871. The water has been above this point 124 days in 1849, 60 days in 1851, 34 days in 1858, 52 days in 1859, 58 days in 1871, 15 days in 1873, and 67 days in 1874.

Belle Chasse, Greenwood, and Point A'La Hache crevasses occurred about April 13, with water 0.4 foot above high water of 1871. Any rise above the "danger-line," occasions considerable anxiety, while one foot above it occasions serious alarm. The levees

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are carefully watched, and preparations made for the certain danger which follows such a stage of water. An idea as to the extent of country generally covered by these floods, the source whence they spring, and the amount of damage done, can be best conveyed though imperfectly, by outlining the flood of this year, which has proved one of the most remarkable on record. It resulted from a conjunction of the freshets of the Upper Ohio, the Red, Arkansas, White, and Ouachita, a combination considered by Generals Humphreys and Abbot as almost impossible. In regard to the flood of the Mississippi and Arkansas, they say (page 380, Report on Mississippi River,) "The union of the greatest floods in both rivers is of course possible, but so highly improbable as to amount to a practical impossibility."

The year opened with the Upper Mississippi and Missouri at or below their average depth, a condition which most fortunately continued until late in June. The Ohio at Cairo, in January, rose to 18 inches above its mean monthly stage, an excess which was increased to 5½ feet in February, 6½ in March, and 8 feet in April. Only the water of the Upper Ohio to March 31 injuriously affected the Mississippi below the White River. This excess of water came almost entirely from the Upper Ohio, the Tennessee and Cumberland remaining at or below their mean stage. A rise in the Cumberland of 28 feet from March 18 to 23, contributed, however, to the flood.

At Cincinnati the river stood 8 feet above the average in January, 3 feet in February, and was at its normal mean stage during March. During January the White River was 3 feet above its mean monthly depth. It fell to its normal condition by February 20, when the unusually heavy rains of that date caused a raise at Jacksonport of 12 feet in two days, carrying the river to a dangerous stage, which was maintained with slight fluctuations until the last of March, the mean depth of that month being 23.38 feet, 13 feet in excess of its normal mean. The excessive rains of April 7 and 8 again caused the river to rise rapidly, and continued rain-fall afterward slowly carried it to its maximum yearly height, 31.05 feet, on April 23.

The Arkansas ranged at about a foot above its normal stage until February 20, when the same storm which affected the White, then caused a rise of 11 feet in two days, leaving it at a very high stage, from which it only fell to its average depth late in March, then to be raised by the long-continued rains of April to its flood height, 23.00 feet, on the 25th of that month.

At the mouth of the White River the river stood in January 4 feet, in February 1 foot, in March 5 feet, and in April 9 feet above the monthly mean stages. The Red River stood in January 7 feet above the mean depth, in February 3½ feet, in March 9½ feet, and in April 10¼ feet. The most remarkable feature about this rise was its steady manner and long duration. The river rose constantly from February 2 to April 4, sixty-two days, and in but one did the rise equal a foot, and in forty subsequent days the entire range was but 2 feet.

It is more than probable that even a part of this small range was due to the Wilson Crevasse, a short distance below Alexandria, and minor breaks which occurred April 11.

The maximum was reached May 8-10, 34.90 feet. The Ouachita was also extremely high during the same months, attaining its maximum at Monroe, Louisiana, on April 28, standing then one foot higher than was ever before known.

The experience in the Yazoo River was the same as in the others named, the stage of the river during freshets always depending on the amount of water obtained by overflow from the Mississippi.

The stage of water commenced to cause anxiety at Memphis on March 9, and at Vicksburg on March 12, the stage of water, together with the conditions of the tributaries of the Mississippi, giving promise of high water.

Alarm commenced at Greenville, Miss., the last of February, when the floods of that month from Arkansas and White Rivers were felt. By March 10 the conditions of the river at the State line was sufficiently serious to cause an extended and thorough inspection of the levees by Gen. M. Jeff. Thompson, state engineer of Louisiana.

On March 13 Bass Crevasse, Louisiana, 3,000 feet wide and 6 feet deep, formed, followed March 15 by Bolivar Landing, 1,900 feet wide; Cook's, (four miles above Bolivar,) 232 feet wide, March 20; and Glass Cock's, Louisiana, 4,000 feet wide and 3 feet deep, March 29.

Before this time, however, the condition of affairs had become alarming. Small crevasses forming everywhere, from Mouth of White River to New Orleans, with thousands of acres under water contiguous to the crevasses named.

By April 1 it was evident that the freshet would equal, if not exceed, in extent and damage any ever before experienced, a large extent of country being already inundated, with rises that day of 21 inches at Cincinnati; at Nashville, 6 inches; Saint Louis, 9 inches; and at a stand at Shreveport. In addition, the unusual rains of March 27 to 31 rendered a continued rise certain. A very slight fall gave renewed hope early in April to the inhabitants from Cairo to White River that the worst was past. From the White to the Red, danger continued, while from the Red to New Orleans the danger daily increased, culminating on April 16 from Red River Landing to New Orleans.

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During April, crevasses had followed each other with unusual rapidity.

The extent of country under water probably has not been equaled during the past thirty years.

Greenwood, Miss., was entirely submerged; the water being higher than in 1867, the standard high water. As this place is located on ground considerably higher than the ordinary level of the Yazoo bottom, and near the outlying bluffs, it is certain that the whole bottom was covered.

As regards the comparative height of the flood, it appears that from Cairo to Memphis the water varied from 43 inches lower at Cairo to 11 inches lower at Memphis. This difference appears on first sight to be an extraordinary one. It is evident on consideration that of the water above 46 feet on the Cairo gauge fully two-thirds overran the right bank into the Saint Francis bottom. Indeed, during 1867, the river for some seventy miles was said to have been from ten to fifteen miles wide. From Memphis to Helena, the variation from 1867 was very slight; the stage of water being the same at Helena in 1867 and 1874.

At Helena, however, in 1862, the water was 7 inches higher than in 1874. At Jacksonport, Ark., the water was 21 inches below that of 1867. At Little Rock, Ark., the water was 6.70 feet below that of 1857 as compared with 1867; the variation is unknown.

At the mouth of White River, this year's freshet was practically the same as 1867; being reported as only 0.20 foot lower.

From White River down, reliable information has been obtained from Mr. Samuel D. McVernon, chief engineer of levees for Bolivar and counties, Mississippi, to the effect that at the mouth of White River the water was lower than 1862; but from there to the end of Catfish Point, Bolivar County, the water was higher than ever before known, being 22 inches higher on the point. The height of the water grew less until at Ben Lomond, opposite Lake Providence, it was 5 feet lower. The gauge at Lake Providence shows it to have been 3.89 feet lower at that point. He states that this was caused by all the levees on the opposite side of the river having been broken in this and former years; giving free egress for the river into Bayou Macon and Tensas River, Louisiana. This data positive. At Vicksburg the water of this year was 5.40 feet below 1862, and 2.02 feet below that of 1867; the difference being accounted for by facts given above. At Natchez the difference between this year and 1859 fell to 3.84 feet below 1859, and 1.11 feet below that of 1867. This diminution is attributable to the high ground above and below Natchez, and to the fact that the levees near were in good condition, so that no considerable crevasse occurred near there.

At Munroe, La., on the Ouachita, the river was one foot higher than ever before known. At Shreveport, La., the water of this year was 2.75 feet below that of 1859.

At River Landing, this year exceeded the freshet of 1867 by 0.72 foot, which diminished at Baton Rouge to 0.27 foot through the numerous crevasses between the two points.

At Carrollton, the water of 1871 was 0.55 foot below this year, and at New Orleans 0.67 foot below.

In order that forecasts for future floods can be correctly made, attention is called to certain peculiarities in the rise and fall induced by the immense reservoirs—the Saint Francis and Yazoo bottoms. In 1858, the highest stage of the river was reached at Cairo, on June 21 and 22, 50.56 feet, when the river fell steadily. The stage at Memphis closely followed that at Cairo; attaining its maximum on the 23d. Helena is seventy miles below, and the maximum would naturally be expected June 24; the river, however, rose steadily from 43.1 feet on the 23d to 49.00 feet on July 2, where it stood until July 7. By July 5 the water stood at 31.46 feet, a fall of 17.54 feet.

In 1859, at Cairo, the record is wanting to March 21, when the river stood at 44.26, rising after that. The maximum was evidently attained a week or more before, as the maximum was reached at Helena on March 22. At Cairo, the water rose steadily from March 21 to April 1, (36.2,) while Helena as steadily fell until April 7; Helena rose steadily from May 9 to May 22, while Cairo had experienced in corresponding time a decline of 11.67 feet. In 1861, the highest water at Helena occurred May 2, 41.86 feet, against 44.16 feet at Cairo on April 24. Cairo, in the mean time, had fallen 2.42 feet. In 1872, Cairo received its maximum water, 40.20 feet, April 19 and 20, while Helena's was on April 26, 39.03 feet. In 1873 the Cairo high water was April 12, 41.60 feet; that at Helena April 20–22, 39.70 feet, when Cairo had declined 2.4 feet. In 1874, the maximum stage occurred at Cairo, April 26, 48.37 feet; while that at Helena followed only on May 11, 45.82 feet; Cairo then having fallen 2.39 feet. Due allowance in these statements has been made for the time necessary for the water to travel from Cairo to Helena, three days for the three hundred and eighteen miles.

The lateness of the Helena high water depends on the stage of the river, being in these instances three days later for 40 feet at Cairo; five to six days for 43 feet; twelve days for 48 feet and above. In other words, the amount of overflow from the river into Saint Francis Swamp determines the date. For the first ten miles west from Memphis, in 1867, the bottom averaged 5.6 deep, while from west of the ridge at the end of

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the tenth mile of the Memphis and Little Rock Railway, to Madison, forty miles, the depth was much greater, as indicated by the high water-marks of 1871 and 1874. There was probably an average depth of 7 feet from Memphis to Madison in 1874. Vicksburg gauge was similarly, although less affected, by the Yazoo bottom. In 1858, the high water was probably nine days late; in 1872, three days; in 1873, two days; and in 1874, four days later. The date of high water in 1858 is so complicated by crevasses that it could be exactly determined only by more time than can be spared to the question. Crevasses also affect somewhat the rise and fall. The crevasse at Bolivar Landing, March 15; Cook's, March 20; and Point Lookout, March 13, affected the readings of the Lake Providence gauge, there being a rise of only 0.27 foot in eight days, against 1.80 feet at mouth of White River; the exact fluctuations are unfortunately wanting, owing to the lack of gauge-reading for six days at mouth of White River, which had to be arbitrarily interpolated.

The fall of 1.35 feet at Baton Rouge on April 17, against a rise of 0.50 foot at Red River Landing, of the day previous, shows the marked effects of Morganza, Hickey, McCulloch, and Port Hudson crevasses.

The crevasse of Belle Chasse, April 9; Bonnet Carre, April 11; Greenwood, April 11, and other minor ones, caused a fall of one inch at New Orleans, May 8, and a stand for four subsequent days.

Although correct forecasts for the river will be productive of most happy results, yet the dissemination of speedy and correct information as regards the stage of water in the various rivers will yet prove a far greater good, as every intelligent man along the river is able to estimate the rise at his own plantation when this general information is added to his local knowledge and experience. A knowledge as to range of the river is almost entirely unknown among those really most concerned in possessing it; save a few educated gentlemen who have investigated the subject, and a small proportion of the steamboat-men, but little knowledge is had on this point. This need has been constantly recognized by the office in the publication of the New Orleans river stage below high-water mark. The real knowledge desired during high water is the proximity of the water to some well-known high-water mark.

The office is able to extend in a continued permanent form, at no additional expense, this information by adding it to the river-bulletin which is issued, so that whenever it is placed in the hands of any person all needful data will be before him. If adopted, New Orleans should report from low water, which will obviate the necessity of any special note on that station.

The establishment of any fixed "line" cannot meet the many and varying conditions of the river; but such reliable data will enable parties interested to base their calculations on this information, and conform its position to their particular locality, whether above or below the general level of the country. Appendix No. 21 shows the form and kind of data referred to. The old zeros at Davenport, Keokuk, and Warsaw are retained, as being so well known to every river-man in the country.

Accompanying the report are transmitted the gauge reports of twenty-eight stations, from 1866 to 1874, so arranged as to show readily the constitution of any rise or fall from its commencement to its termination.

It is more than probable that errors of some kind have crept into the report through possibly incorrect data or hasty and imperfect conclusions. In many, indeed most cases, conflicting information was received, which had to be duly weighed and valued at its proper worth. The lack of positive data outside of the regular signal-service and engineer stations is surprising. Acknowledgment is due to the city engineers of Saint Louis and Memphis for valuable information extended, as well as to the several observers of the Engineer Corps at gauge-stations. To Colonel J. Shaler Smith, Engineer Baltimore Bridge Company, is due thanks for the reading at Saint Charles, Mo., which shows so clearly the actual effect of the Missouri on the Mississippi.

From Colonel Tayler, Cairo Improvement Company, Cairo, Ill., was obtained a series of river-observations at that point, extending, with few breaks, from 1858 to 1868, which, although not continuous, proved most valuable. It is the best and most extensive individual record on the river. Mr. James B. Miles, of Helena, who has devoted his leisure for years to the study of the river, contributed data in regard to the floods at that point, which will prove valuable to any person interested in elucidating the question of the effect of the Saint Francis Swamp as a reservoir for preventing future disastrous floods. Free use has been made of the materials contained in the standard work on this question, Humphreys and Abbot's most valuable report, as also of data in the various official reports of minor importance. The establishment of a gauge at the point where the Cairo and Fulton Railway crosses the White River, a little below Jacksonport, and also at Chattanooga, Tenn., will furnish, together with present reports, much valuable information during dangerous seasons. The rise which proved injurious this year from Cairo to mouth of White River was carried to its greatest height by an unexpected addition from the Tennessee, when the danger seemed past. Readings should be made on the White River from February 1 to April 1,

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and on the Tennessee from February 1 to April 15. Reports from Chattanooga during the low-water season would also prove valuable to commercial interests, and are recommended.

In regard to the depth of water at low-water mark on the Lower Mississippi, or indeed scarcely any point, nothing definite can be given, as the depth is never the same for two consecutive weeks.

I am, respectfully, yours,

A. W. GREELY,
First Lieutenant Fifth Cavalry, A. S. O. and Inspector.

The CHIEF SIGNAL-OFFICER OF THE ARMY.

PAPER 32.

SAINT LOUIS, MO., *July* 7, 1874.

GENERAL: I have to submit the following report concerning the "danger-line" proposed to be established on the Missouri River:

At Omaha, the river becomes dangerous to property when it attains a level of 16 feet above the zero in use, the low-water mark of 1867. Between Omaha and Plattsmouth, the property first to be injured consists of the farms on the bottom-lands, which are mainly on the east side of the river. On the map, inclosure No. 1, inclosed in red lines, (broken when the exact line of bluffs is not definitely known to the inspector,) is shown the country covered by the flood of June, 1844, which covered the whole country from bluff to bluff, except the small sections blocked out in red ink. On the west side of the river, the Burlington and Missouri River Railroad, in Nebraska, has been lately built over considerable ground covered by the flood of April, 1867.

The ground covered during 1867 is shown, where definitely known, by blue lines. A large extent, which was probably covered, is omitted as being unauthenticated by careful observers. The difference between the height of the floods of 1844 and 1867 could not here be determined, accounts varying from 1 to 10 feet. Probably the flood of 1844 was 3 feet higher until the mouth of the Kaw, or Kansas, was reached.

At Plattsmouth, the danger-line may be fixed at 11 feet 6 inches above the present zero, an imaginary low-water mark.

It is recommended that the zero of the gauge be set at low-water mark of December 6, 1873, 5 feet 1 inch below the present zero.

On November 10, 1865, a simultaneous gorging of the Missouri and Platte Rivers carried the river down to 7 feet 10 inches below zero, but it lasted but about an hour.

The damage from high water between Plattsmouth and Saint Joseph would be confined almost entirely to the east side of the river, consisting of farms, and a portion of the Hannibal and Saint Joseph Railway. The blocks marked out in red ink in this district show sections never yet overflowed.

The Platte River, which unites with the main river at Plattsmouth, is a most important and large contributor to the floods. The river at times rises very rapidly, swelling the Missouri 4 and 5 feet at times in a day. A special observer at Fort Kearney, two hundred and fifty miles from the mouth, would insure the earliest premonitions of a rise. Telegraphic facilities are ample at Kearney.

At Saint Joseph, the danger-line can be fixed at 15 feet 6 inches above the present zero, or at 95.70 feet of the bridge-gauge. It is recommended that the zero be changed to low water of December 11, 1873, 3.45 feet below the present zero, 76.75 feet of the bridge-gauge.

Between Saint Joseph and Leavenworth, the same kind of property is liable to injury from high water—farms in the bottoms, and the railways in isolated places.

The danger-line at Leavenworth is 15 feet 8 inches above the zero of the present gauge, or 24 feet of the fort-gauge. The present zero marks no definite point, and is determined from a number of comparative readings to be 5 feet 4 inches above the zero of the fort-gauge, which is low water of November 30, 1871. The present gauge is not correctly scaled, owing to changes from its original position. The zero should be changed, and the gauge properly scaled during the low water of this year.

Between Leavenworth and Kansas City, the amount of land subject to overflow is very small, and the property endangered almost entirely farms.

At Kansas City the danger-line is 21 feet above the present zero. The lowest water known was January 6, 1874, 1 inch below the present zero. Opposite Kansas City, as shown on map, (enclosed, number 1,) a considerable strip of land was overflowed through a slough, ranging in slough from 4 feet to 10 feet deep, and on other ground up to 4 feet. A similar overflow of less extent prevailed in 1873. Between Kansas City and Lexington, farms only suffer from high water. There is but little land subject to such overflow until Camden is reached, when from 18 feet up (of K. C. gauge)

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the country commences to overflow, reaching, by 20 feet, Crooked River. Not much land is covered until over 20 feet is reached, owing to the peculiar configuration of the country.

The Saint Joseph and Lexington Railway, lately built, would suffer from 21 feet upward.

At Lexington, the danger-line is 21 feet above the present zero, and 24 feet 6 inches would drive out all settlers between Camden and Crooked River. The zero of the gauge is low water of 1861. Between Lexington and Brunswick, there is considerable bottom-land farms, which 22 feet and above would overflow.

At Brunswick, the zero is an assumed point, and its reference to the high or low water of any year is unknown.

Probably 12 feet would equal the high water of 1867, which covered considerable country between Brunswick and Booneville, as shown on the map. (Enclosed, 1.)

Eleven feet is fixed on as the point above which damage to farms will ensue.

At Booneville, the danger-line is fixed at 23 feet above the present zero, low water of December 1, 1872.

Between Booneville and Jefferson City, a moderate amount of country is subject to overflow, the property to be affected consisting of farms.

At Jefferson City, the danger-line is fixed at 22 feet above the zero, low water of 1867.

No country to any amount has been overflowed since June, 1844; the bluffs approaching near the river and the bottom-lands being much higher than above.

At Herman, the danger-line is fixed at 16 feet above the zero, low water of January 21, 1874.

Along the whole river, the inspector could learn of no property, other than farms and road-beds of railways, as being in danger of injury from floods.

It is recommended that a special river-station be opened at or east of Fort Riley, where the Republican, the most considerable of its tributaries, empties into the Kaw.

The inspector was desirous of analyzing, as far as practicable, the proportion of water coming from each river; but the task would require much more time than he believes the Office would think needful.

It is firmly believed that at least half the water above low-water mark of the Missouri is received below Omaha, and that the probable rise can be predicated from the amount of rain-fall in each section. It is recommended that a rain-gauge be furnished each special observer, and the amount of rain-fall reported with the river.

Nothing has been said in regard to the depth of the river at low water; the channel and depth are continually changing, and nothing reliable can be furnished by any one.

I am, respectfully, yours,

A. W. GREELY,

First Lieutenant Fifth Cavalry, A. S. O. and Inspector.

The CHIEF SIGNAL-OFFICER OF THE ARMY.

PAPER 33.

BOSTON, MASS., *October* 19, 1874.

GENERAL: I have the honor to submit the following report upon the "danger-line" of the Ohio River from Cincinnati to Paducah, Ky.

At Cincinnati it is placed at 50 feet above the zero ordinarily used, that of the gauge at the city water-works. At that point, the water commences overflowing the lower part of the city; the area increasing but slowly as the water rises.

Observations taken at 6 a. m. and 6 p. m. each day since June 1, 1858, are enclosed, having been obtained from the city water-works of Cincinnati.

From them it appears that the water has attained a height of 50 feet or more, as follows: 1859, nine days, (February 7, April 1, May 1;) 1862, nine days, (January 7, April 2;) 1865, nine days, (March 6, May 3;) 1867, nineteen days, (February 7, March 12;) 1870, seven days, (all January;) making, in all, fifty-three days in sixteen years.

Damage is occasionally done to merchandise on the levees by sudden rises of 10 feet or more in twenty-four hours. Such have occurred in sixteen years as follows: 1859, February 17–18, 29 feet 5 inches to 39 feet 11 inches; September 20–21, 3 feet 3 inches to 15 feet 7 inches, (7 feet 3 inches occurring in 12 hours;) December 6–7, 25 feet 1 inch to 35 feet 2 inches; 1860, April 11–12, 23 feet 6 inches to 34 feet 9 inches; November 1–2, 10 feet to 23 feet 4 inches, (9 feet 8 inches of it in 12 hours;) 1861, September 29–30, 8 feet 5 inches to 29 feet 5 inches, (11 feet 1 inch in 12 hours and 26 feet 2 inches in 36 hours;) 1862, April 9–10, 29 feet 10 inches to 42 feet 5 inches; 1864, May 17–18, 21 feet 1 inch to 31 feet 5 inches; 1865, February 25–26, 25 feet; 4 inches to 36 feet; May 26–27, 29 feet 1 inch to 39 feet 11 inches, (8 feet 1 inch in

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12 hours;) December 21–22, 22 feet 11 inches to 34 feet 2 inches, (6 feet 8 inches in 21 hours;) 1866, March 12–13, 17 feet 4 inches to 30 feet 10 inches, (7 feet 5 inches in 12 hours;) July 25–26, 9 feet to 19 feet 5 inches, (6 feet 1 inch in 12 hours;) 1867, February 14–15, 29 feet 8 inches to 40 feet; 1868, January 6–7, 24 feet 10 inches to 35 feet 2 inches; June 17–18, 13 feet 7 inches to 24 feet 1 inch; 1870, April 20–21, 27 feet 3 inches to 38 feet 4 inches; 1871, January 17–18, 10 feet 7 inches to 20 feet 10 inches; 1872, April 9–10, 20 feet to 37 feet 5 inches, (14 feet 3 inches in 12 hours;) 1873, February 6–7, 18 feet 4 inches to 28 feet 9 inches; in all, twenty times.

The most notable continued rise was from September 29 to October 1, 1861, 11 feet 1 inch in 12 hours, 21 feet in 24 hours, 26 feet 2 inches in 36 hours, 30 feet 1 inch in 48 hours, and 32 feet 1 inch in 60 hours. This is followed in importance by those of January 19 to 20, 1859, 21 feet 9 inches in 60 hours; January 15 to 17, 1870, 21 feet 5 inches in 60 hours; and May 25 to 27, 1865, 17 feet 1 inch in 48 hours.

At Louisville, Ky., the range of water is 39.66 feet from low water of 1856 to high water of 1832.

The "danger-line" is fixed at 24 feet, although the amount of property injured by 25 feet is very small.

The river has stood at 24 feet or more, 19 days in 1859; 33 days in 1867; and 3 days in 1874; in all, three times, and 55 days, in the last sixteen years.

Enclosure No. 2 is a map of Louisville, whereon, in red figures, is marked the height, with reference to the city-datum, which is identical with the zero of the river or canal gauge, from which can be seen the amount of territory which would be flooded by any particular height of water. The data were furnished through the courtesy of Mr. Thomas P. Shanks, City Engineer of Louisville.

At Evansville, Ind., the range of water is 49 feet from low water of 1856 to high water of 1832.

The "danger-line" is placed at 34 feet. The water has stood at or above such point in 1832, 1847, 1856, 1859, 1867, 1870, 3 days in December, 1873, and 36 days in 1874.

This height (34 feet) injures corn-crops either in field or crib. The corn is usually in crib from December to February, sometimes longer. The bottom-lands are very level, and extend back, in many places, from twelve to fifteen miles, both above and below Evansville.

Forty-two feet would damage a great many dwellings along the river. Forty-four feet would flood all the bottom-lands between Evansville and Paducah, and would submerge 2 or 3 feet many of the houses in Leavenworth. At Evansville, there is always a large amount of freight on the levee; but the merchants are better informed by private telegrams than they can be by official ones, as dispatches are received every evening from all quarters that can in any manner seriously affect the river at that point. The Wabash, which empties into the Ohio some twenty miles below Evansville, sometimes affects the river very greatly. In 1867, the river at Evansville reached its height, March 16, 11 inches below the high-water mark of 1832; at Shawneetown it was reported 8 inches higher than the flood of 1832.

At Evansville, the river opposite Locust street was 6 feet deep at low water 1867, and opposite Main street 3 feet deep. Changes are constantly occurring in the bed of the river, and no standard figures can be given for depth in channel.

At Paducah, Ky., the range increases to 53 feet through the Wabash, Cumberland, and Tennessee Rivers, from low water of 1857 to high water of 1867. The line of high water has been marked on the gauge at 51 feet, through an error of the painter, who promised the observer that he would correct it.

The "danger-line" is fixed at 40 feet on the present gauge. The water has been above that point twenty-nine days during the present year. The injury done is mainly to farms and crops in the low-lands.

The importance of a station on the Tennessee River for the portion of the Ohio between Paducah and Cairo has been pointed out in my report on the Mississippi River. Attention is called to the remarks therein made.

I am, respectfully, yours,

A. W. GREELY,
First Lieutenant Fifth Cavalry, A. S. O. and Inspector.

The CHIEF SIGNAL-OFFICER OF THE ARMY.

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PAPER 44.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE,
Washington, D. C., Saturday, May 30, 1874.

SPECIAL RIVER REPORT.

During the past twenty-four hours the Mississippi has fallen at all reporting stations from La Crosse to Helena, and remained unchanged at Saint Paul and New Orleans. The greatest change has been at Helena, where it is 19 inches.

The Missouri has fallen from Yankton to its mouth.

The Ohio has fallen 4 inches at Pittsburgh, risen 6 inches at Marietta and 1 at Cincinnati; remained stationary at Louisville and fallen thence to Cairo.

The Red, Arkansas, Cumberland, Allegheny, and Monongahela have fallen slightly at all stations.

The rain-fall in the watersheds of the several rivers has been: In the Mississippi, seven hundredths of an inch at Cairo; in the Cumberland, seventeen hundredths at Nashville; and in the Red, two hundredths at Shreveport.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

PAPER 45.—FORM 31.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

Report of observations on temperature of water at ——— for the week ending Saturday, ———, 187-.

Day and date.	Time of observation.	Temperature of air.	Temperature of water at surface.	Temperature of water at bottom.	Depth of water.	Remarks.
Sunday						
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						

———, ———,
Observer.

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PAPER 46.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE,
Washington, D. C., Saturday, December 27, 1873—1 a. m.

SYNOPSIS FOR THE PAST TWENTY-FOUR HOURS.

The storm which was central off the Middle Atlantic coast this morning, moved to the northeastward, with brisk and high northeasterly to northwesterly winds and heavy snow and rains in the Middle and East Atlantic States.

From these districts westward over the Lake region, the Ohio Valley, and the Northwest, cloudy weather and snow, and light to brisk variable winds are reported.

Partly cloudy or clear weather, with increased pressure and light winds, now prevails in the South Atlantic and Gulf States.

The temperature has fallen decidedly in the extreme Northwest and slightly in the Upper Lake region.

PROBABILITIES.

For New England, and thence westward over the northern portion of the Middle States and the Lower Lake region, generally cloudy weather with snow, and light to fresh variable winds, will prevail.

For the southern portion of the Middle States, and thence southward over the South Atlantic States, partly cloudy and foggy weather, with light to fresh southwesterly to northwesterly winds, increasing pressure and slight changes of temperature.

For the Ohio Valley, and thence northward over the Upper Lake region, increasing pressure, lower temperature, with generally cloudy weather and snow, followed by cloudy weather in the afternoon.

For the Northwest, cloudy weather and light snow in the river valleys, followed by clearing and cold weather and fresh to brisk northerly winds during the afternoon.

For the Gulf States, and thence northward over Tennessee, increasing pressure, with lower temperature, northerly winds and clearing weather.

For the canal region of New York, the temperature will fall below freezing during Saturday night.

Published by co-operation of the War and Post-Office Departments.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

PAPER 47.

WEEKLY WEATHER CHRONICLE.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE,
Washington, D. C., August 27, 1874.

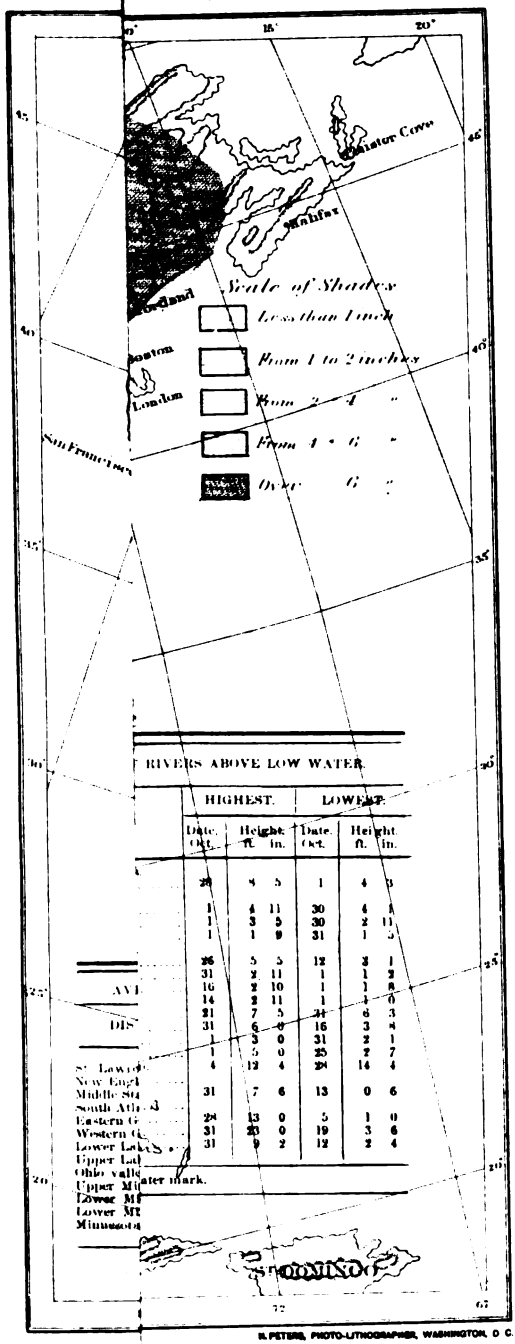
GENERAL SUMMARY FOR THE WEEK ENDING THURSDAY, AUGUST 27, 1874.

An area of low barometer moved from the northwest eastward over the Saint Lawrence Valley and New Brunswick, on Thursday of the past week. A second moved from Kansas and Northern Missouri slowly southeastward across the country to the South Atlantic coast during Saturday, Sunday and Monday, causing extensive and, in many places, heavy rains in the Middle and Southern States. A third depression is apparently central this morning in Nebraska, while an area of high barometer, with low temperature, covers the northeastern sections of the country.

The rain-fall for the past week averages about as follows in the districts mentioned: Saint Lawrence Valley, 0.1 inch; New England, 0.75; Middle Atlantic States, 0.95; South Atlantic States, 1.0; Eastern Gulf States, 1.0; Western Gulf States, 1.5; Lower Lake region, 0.55; Upper Lake region, 0.5; Ohio Valley, 0.6; Tennessee, 1.75; Upper Mississippi Valley, 0.65; Lower Missouri Valley, 0.5; Minnesota, 1.0.

Thursday, 20.—Threatening and rainy weather continued in the Gulf States and partly cloudy weather, with areas of rain, prevailed in Indian Territory, the Upper Mississippi Valley, Dakota, Minnesota, and the northern portion of the Upper Lake

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region. Clear or fair weather was reported from the remaining districts, attended by a decided rise of temperature in the Middle States, the thermometer reaching 100° at Washington during the afternoon.

Friday, 21.—Increasing cloudiness, with cool northerly winds and rain, prevailed in the Lake region, the Saint Lawrence Valley, New York and New England. High temperatures and clear weather continued in the southern portion of the Middle States. Warm, partly cloudy weather, with occasional rain-areas, was reported from the Southern States, the Ohio Valley and the Northwest, except in Minnesota, where falling temperature was experienced.

Saturday, 22.—Cool, clear or clearing weather prevailed in the Lower Lake region, New York, New England, the Saint Lawrence Valley and the Eastern British provinces. Cloudy or rainy weather was reported from nearly all stations in the remaining sections east of the Rocky Mountains.

Sunday, 23.—Threatening and rainy weather continued all day in the Middle Atlantic States, heavy rains falling in Virginia and Maryland. Cool, clear, or partly cloudy weather was reported from the Saint Lawrence Valley, New England, New York and the Lake region, and partly cloudy weather, with occasional rain, from the South Atlantic and Gulf States, the Ohio Valley, Tennessee and the Northwest.

Monday, 24.—Cloudy and rainy weather continued in Eastern Tennessee, the South and Middle Atlantic States and on the Gulf coast. Clear or fair weather was reported from the remaining districts east of the Rocky Mountains. The temperature remained low all day throughout the Lake region and thence eastward to New England and New Brunswick.

Tuesday, 25.—Partly cloudy or clearing weather, with northeasterly winds, continued in the Atlantic States from New Jersey to Florida, heavy rains falling in the northeastern portion of the latter State. Clear or fair weather prevailed elsewhere east of the Rocky Mountains, with continued low temperatures throughout the Lake region and thence to the middle and east Atlantic coasts.

Wednesday, 26.—Falling barometer, fresh and brisk southeasterly winds, increasing cloudiness and rain, prevailed in the Northwest, extending thence southward and southeastward to Indian Territory, Arkansas and Tennessee. Clear or fair weather was reported from the Gulf and Atlantic States, the Lake region and the British Provinces, with continued low temperature in the northeastern sections and brisk northeasterly winds on the Atlantic coast from New Jersey to Florida.

Thursday, 27.—The morning reports show clear, cool weather throughout the Lake region, the British Provinces, New England and the northern portion of the Middle States, and warm, clear or fair weather in Florida and the Gulf States. Cloudy weather prevails in the remaining districts east of the Rocky Mountains, with areas of rain from Tennessee northwestward to Minnesota.

RIVERS.

During the past week the Red River has fallen 5 inches at Shreveport. The Cumberland has risen slightly at Nashville. A freshet wave, about 3 feet in height, is at present passing down the Missouri, its crest being now between Omaha and Leavenworth. The Mississippi has fallen slightly between La Crosse and Saint Louis, 1 foot at Cairo, 15 inches at Memphis, 3 feet at Vicksburg, and 4 inches at New Orleans, but has risen 1 foot at Saint Paul. The Ohio has fallen 2½ feet at Cincinnati and 2 at Louisville, but has risen 3 feet at Pittsburgh.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

PAPER 48.[1]

MONTHLY WEATHER REVIEW, OCTOBER, 1873.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

STORMS.

During this month fourteen well-defined areas of low barometer have been indicated on the tri-daily weather-maps of the Signal-Service, some of which have, however, passed over the extreme limits of the territory covered by our stations. Besides these, there have been several indefinite barometric depressions, accompanied by rain and cloud. In detail the storms have been as follows:

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No. I. *October* 3, 4, 5, 6, 7, *and* 8.—This was a severe cyclone that was first recognized as existing some distance southwest of Cuba; it passed over Florida on the 6th, and continued its course northeastward parallel to the Atlantic seaboard. Numerous disasters were caused by it at sea, and the settlement of Punta Rassa, Florida, was entirely destroyed, a hurricane velocity of ninety miles having been recorded at that place. It struck Lake City very suddenly October 6, at 6.10 p. m. Reports of damages have been received from Jacksonville, Saint Augustine, and Charleston. The wind was not severely felt at Savannah. Destructive gales were also felt off Cape Henry. A severe norther was induced by the extensive area of low pressure, and was felt along the entire coast of Texas and Louisiana as far as Mobile. This cyclone appears to have passed over the Shetland Islands on the 10th and 11th.

No. II. *October* 3, 4, *and* 5.—Produced a very general rain in the Lake region.

No. II*. *October* 4 *and* 5.—This kept to the north of the Lake region, and on the 5th apparently united with No. II as the latter passed down the Saint Lawrence Valley. The barometer fell with unusual rapidity at Eastport, where the wind velocity rose to thirty-two miles on the 5th.

No. III. *October* 6 *and* 7.—This may be regarded as a disturbance subsidiary to Nos. I, II, and III. It arose in the Middle Atlantic States, and as it slowly moved northeastward was accompanied by heavy rains on the Atlantic coast. Violent lightning was reported at New Haven on the 6th, and a heavy blow, with rain, at Cape May.

No. IV. *October* 6 *and* 7.—This storm-center kept so far to the northward that it only produced strong southwest winds and cloudy weather on Lake Superior.

No. V. *October* 5, 6, 7, 8, 9, 10, 11, *and* 12.—The rains and barometric depression prevailing over the California coast on the 4th, 5th, and 6th of the month re-appeared on the 7th as an incipient storm-center in Utah, which, after extending northeastward over Dakota and Manitoba, turned to the east and southeast into Minnesota and the Upper Lake region; it then disappeared in Canada, but re-appeared after inducing a small center of disturbance, No. V*, on the lower lakes, which latter moved eastward over New England, joining No. V in Nova Scotia. Violent thunder-storms were reported at Indianapolis and La Crosse.

No. VI. *October* 12.—This was but a slight barometric depression moving northeastward across Minnesota. High winds prevailed at Yankton.

No. VII. *October* 14 *and* 15.—This disturbance appears first i Kansas, although there is reason to suspect its existence two days earlier in Northern .rizona. In its passage toward Lake Superior it seems to have lost most of its intensity, a change due possibly to the presence of the more extensive disturbance. No. VIII, far to the north and northeastward.

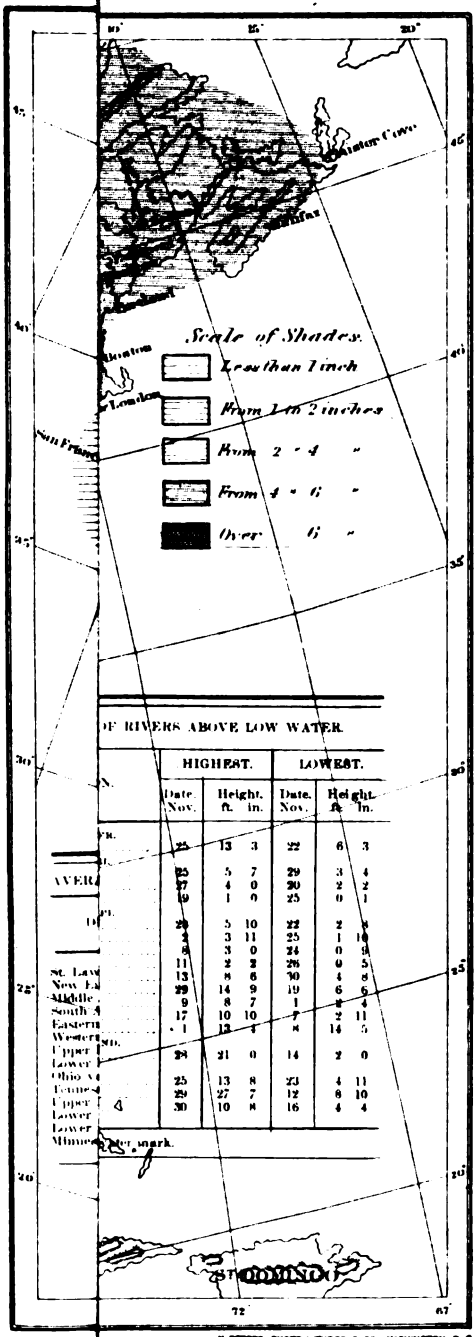
No. VIII. *October* 16 *and* 17.—This barometric depression became first recognizable as such in the valley of the Saginaw, having probably pursued its previous course far to the northward. On the 16th, it moved rapidly southeastward over Nova Scotia, and then turned to the east. Brisk winds prevailed over Massachusetts and the Bay of Fundy.

No. IX. *October* 16, 17, *and* 18.—This storm originated as a general rain on the morning of the 16th, extending from Northern Texas to Nebraska, and was probably produced by the cooling of the mass of air that was then being forced from the Gulf of Mexico and the Mississippi Valley northwestward up the slopes of the western plains. The consequent area of low pressure gradually closed in on all sides, losing its very extended elliptical form until on the afternoon of the 17th, its center appeared as a small oval in Minnesota, attended by high winds and an extended area of rain. A severe gale was reported at Breckinridge on the 17th, and high winds at Saint Paul. The storm-center moved northeastward, and the gale of the night of the 17th and 18th on Lakes Superior and Michigan was, according to the reports from Milwaukee, one of the severest on record, while Alpena reports a gale of forty-four miles per hour from the south. The barometer at Marquette fell to 28.59 inches. Brisk southwest winds and rain prevailed on the lower lakes on the 18th and 19th.

No. X. *October* 18, 19, 20, 21, *and* 22.—This began as a slight depression in the western Gulf States and moving eastward was followed by a severe norther on the Texas coast, while itself increasing in intensity; on reaching the Atlantic coast the depression turned its course to the northeast and developed into a severe storm in the Middle Atlantic States on the 19th and 20th. It then turned to the northwest and held on this extraordinary course until the 21st at midnight, when it had reached the Strait of Mackinaw, being recorded as the severest storm since 1859 on Lakes Huron, Erie, and Ontario, and continuing for forty-eight hours at most places. Its severity is especially commented upon in reports from Cleveland, Oswego, and Buffalo, while the winds on the 20th at Portland, Me., and Saint John's, New Brunswick, were the severest of the month.

No. XI. *October* 20.—This depression was attended by a gale in Manitoba, but passed so far to the northward as not to seriously affect the upper lakes. Reports from Fort Benton, when they come to hand, will probably throw some light on its previous course.

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OF RIVERS ABOVE LOW WATER.

	HIGHEST.			LOWEST.		
	Date. Nov.	Height. ft.	in.	Date. Nov.	Height. ft.	in.
	25	13	3	22	6	3
	25	5	7	29	3	4
	27	4	0	30	2	2
	19	1	0	25	0	1
	28	5	10	22	2	8
	4	3	11	25	1	10
	8	3	0	24	0	9
	11	2	2	26	0	5
St. Law	13	8	6	30	4	8
New En	29	14	9	19	6	6
Middle	9	8	7	1	3	4
South A	17	10	10	7	2	11
Eastern	1	13	4	8	14	5
Western						
Upper L	28	21	0	14	2	0
Lower L						
Ohio Ri	25	13	8	23	4	11
Tenne	29	27	7	12	6	10
Upper	30	10	8	16	4	4
Lower						
Lower						
Mimis						

Zero mark.

H. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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No. XII. *October* 25, 26, *and* 27.—This storm may probably be traced in Northern Texas on the 24th, but came within the cognizance of our stations on the 25th, when it was apparently central in Indian Territory. At that time snow was falling throughout the Northwest and extreme Northwest, being very heavy, with high winds at Yankton. The barometric disturbance was of minor importance, until the 26th, while the snow and rain were increasing in amount; on the latter day the storm-center passed over the lower lakes, and heavy lightning was seen to the northwest of Vicksburg in the evening. On the night of the 27th and 28th the storm was central in New Brunswick, while a southeasterly gale prevailed on the coast of Maine. This was reported as the heaviest storm of the season at Eastport, Portland, Me., Wood's Hole and New Haven.

No. XIII. *October* 27, 28, *and* 29.—This low barometer was formed over the upper lakes, following closely in the wake of No. XII, and in some sense connected with it. The snow and fog that prevailed on the lakes, united with the high wind, made the night of the 28th and 29th one of the wildest description, and numerous disasters were reported from Milwaukee. A southeast gale of forty-four miles velocity prevailed at Alpena. The disturbance disappeared over New Brunswick.

No. XIV. *October* 28, 29, 30, *and* 31.—This storm, after passing slowly eastward, turned southeast to Lake Huron and the lower lakes, accompanied by snow and followed by brisk northwest winds. On the afternoon of the 31st a westerly gale prevailed at Buffalo.

TEMPERATURE.

On Map No. 2 will be found a table of the average mean temperature for the different districts for this month.

For the Middle States, the Eastern Gulf States, the Lower Lake region, the Lower Mississippi Valley, the Ohio Valley, and the Lower Missouri Valley, it will be seen that the temperature averages about the same as for many years past.

The average temperature for New England is about the normal value; while for the South Atlantic States, the Western Gulf States, the Upper Lake region, the Upper Mississippi Valley, and Minnesota, the temperature during the past month, especially in the latter sections, is decidedly below the average of previous years.

RAIN-FALL.

Map No. 3 gives approximately the rain-fall for the country east of the Rocky Mountains, and the table printed therewith shows the excess or deficiency for the various geographical subdivisions.

It will be seen that the region of heaviest rain was over the northern and eastern sections of the country, the quantity diminishing very regularly as we proceed thence south and west. Droughts are reported from Denver, Lake City, and Savannah.

RIVERS.

Upon Map No. 3 will be found a table showing the highest and lowest waters at the principal river-stations. It will be seen that the rivers have generally ranged lower than during September, and at some stations have been reported as lower than usual at this season of the year.

EARLY FROSTS.

The first frosts of the season were reported at the following stations:

October 1. Lexington, slight; Wytheville, light; Oswego light. 6. Toledo, heavy; Detroit, heavy; Saint Paul, severe; Leavenworth, heavy. 7. Saint Louis, heavy; Cincinnati, heavy; Lexington, heavy; Milwaukee, heavy; Detroit, heavy; Vicksburg, light. 8. Charleston, heavy; Vicksburg, light. 13. Wytheville, heavy. 19. Milwaukee; Duluth, heavy. 20. Milwaukee; Lake City, heavy; Vicksburg, heavy. 21. Baltimore, light; Jacksonville, light; La Crosse, heavy; Nashville, heavy. 24. Louisville, heavy. 26. Buffalo, heavy. 29. Baltimore, heavy; Jacksonville, slight; Milwaukee, light; Mobile, light; Knoxville, heavy; Nashville, heavy; Vicksburg, heavy. 30. Mobile, heavy. 31. Mobile, heavy; Nashville, heavy.

ICE IN RIVERS AND LAKES.

The first ice of the season has been reported in the rivers and bays at the following places: Lexington, October 7; Toledo, October 6; Mobile, October 30; Yankton, October 27 and 31; Marquette, October 19.

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EARLY SNOWS.

The first snow-falls were reported as follows: Detroit, October 20th and 21st; Chicago, 20th; Denver, 8th, (on the mountains;) on the 16th, (in the city;) this ended a drought of forty days; and on the 25th, heavy snow; Dubuque, 22d; Louisville, 28th; Lynchburg, 20th; Nashville, 28th; Rochester, 21st, light snow, and on the 28th heavy snow; Saint Paul, 25th, 27th, and 29th; Yankton, 24th and 25th; New York, 26th; Duluth, 19th; Leavenworth, 25th; Escanaba, 21st; Davenport. 27th.

Published by order of the Secretary of War.

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Brig. Gen., (Bvt. Ass'g'd,) Chief Signal-Officer, U. S. A.

PAPER 48[2].

MONTHLY WEATHER REVIEW, NOVEMBER, 1873.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

STORMS.

During the month of November twelve storms traversed the Territory of the United States; the storm-centers of all these, with one exception, moving within the region covered by the Signal-Office Observations.

The following brief notices give the main facts of each storm:

No. I. Approached from the neighborhood of Pembina, on the 1st of November, and, after moving to the southern shore of Lake Superior, preserved an easterly course, reaching the Atlantic Ocean, north of Nova Scotia, on the evening of the 3d. Its mean progressive velocity was therefore from twenty-five to thirty miles per hour, although its cyclonic winds were not very dangerous.

No. II. Followed nearly the same track, but attained somewhat higher velocity. It arrived in Northern Minnesota on the afternoon of the 3d of November, and reached the Saint Lawrence valley on the evening of the 4th. It was accompanied by rain and light snow on the lakes and eastward.

No. III. Coming from the Red River valley on the 6th, and crossing the Lakes, reached Kingston, Canada, on the morning of the 8th, and thence moved northeastwardly.

No. IV. Originated in the western part of the Gulf of Mexico, and moved along the Gulf and Atlantic coasts all the way to Nova Scotia. It started upon this track on the morning of the 6th, and reached Plaister Cove, Nova Scotia, on the morning of the 9th, averaging about thirty-two miles an hour. It was accompanied by fresh wind and rain on the seaboard, and on reaching the Maine coast it was marked by high and dangerous winds in its front. As usual with cyclones taking this track, as it neared Nova Scotia, the barometric depression increased and the cyclonic winds became more violent than when the meteor was moving on lower parallels of latitude.

No. V. Probably originated in Colorado, near the eastern slope of the Rocky Mountains, but was first seen in Kansas on the afternoon of the 10th, and moved first northward to Saint Paul, Minn.; thence on the 11th toward Milwaukee, sweeping eastward with destructive force over the Lakes, and thence to the northeastward. At Milwaukee the gale rose to thirty-two miles an hour, accompanied by high winds and heavy snow on Lake Michigan; and snow and rain on the other Lakes.

No. VI. November 16, commenced its southeastwardly progress from Lake Superior (nearly due southeast) to Boston, passing over the latter place on the evening of the 16th, with heavy snow.

No. VII. Was perhaps the most remarkable continental cyclone of which the Signal-Office observations furnish any details. It was generated about mid-day of the 16th in Northern Georgia, and at once assumed a threatening aspect. During the night of the 16th and morning of the 17th, it steadily advanced to the vicinity of Wilmington, making about two hundred and forty miles in twelve hours, or about twenty miles an hour. Its course was thence northeastward along the inshore margin of the Gulf Stream, which it tenaciously followed to latitude 43° north, whence it struck off into the Bay of Fundy, and thence to the mouth of the Saint Lawrence River. All along, its track was marked, from Norfolk to Halifax and Father Point, by fierce gales, and the incoming vessels reported fearful seas off the coast. At Norfolk the barometer fell to 28.86 inches, with rapidly shifting northeast, north, and northwest winds of high

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velocity on the 17th. Chimneys and fences were blown down, and the shipping in the harbor in many instances dragged their anchors. In the Chesapeake Bay it was extremely severe. At Cape May the wind rose to forty miles, and the barometer fell to 28.76, with very heavy sea, reported by pilots from outside the worst gale known for years. At New Haven, on the morning of the 18th, the barometer fell to 28.72, (with increasing storm,) and at Wood's Hole to 28.60, and 28.61 at Boston, and 28.49 at Portland, Me.—the lowest observed barometers at the last-named points since they became signal-stations. At Eastport, Me., at about 6 a. m., on the 18th, the cyclone attained terrific force, its wind blowing sixty-four miles an hour. Its progress over the Canadian districts to the northward and eastward was equally violent. Its whole course was marked by heavy rain and snow, and its cyclonic indraught extended from the Middle Atlantic coast to the Upper Lakes.

No. VIII. First appeared in the Middle Missouri Valley on the 20th, and moved east to Toledo, whence its course was northeastward, and it soon disappeared.

No. IX. Was also of minor importance, having begun in Northern Lake Superior, and soon disappearing to the northeastward.

No. X. Appears to have been generated near Santa Fé on the 22d, and thence moved toward Western Texas, from which locality, on the 23d, it advanced into the Lower Ohio Valley. Its course thence was in nearly a straight line to Halifax, where it is lost sight of. It was preceded by much rain and snow on the Lakes, and high winds on the New England coast.

Nos. XI and XII. First appeared in the Northwest, on the 23d and 26th of November, respectively, and moved first southeastwardly to Michigan and the Lower Lakes, and thence northeastwardly, with brisk but not very high winds, and frequent rains and snows.

ANTI-CYCLONIC AREAS.

There have been eight decided areas of high barometer passing over the United States during the past month. These anti-cyclonic areas have first appeared in the Rocky Mountain region, and advanced southeastwardly. It is observable that as the season progressed they have selected pathways of higher latitude; and, moreover, their intensity has increased. As these barometric waves have advanced and spread out from the Northwest and West toward the Alleghanies, the pressure rather increased than diminished. Their front has been distinguished as well by low temperatures, heavy snows, and rains, as by high barometer readings, and generally they have given rise to high northerly winds in their front and high southerly winds in their rear, the atmospheric mass drawing around the crest in the direction of the hands of a clock. The very high pressure of the 27th-30th of November, while in the Northwest, by retarding the advance of the storm-center, on its western side, until the pressure over the Rocky Mountains could accumulate, apparently explains the violence of the storm that has since passed over the Lakes. The course of these waves may be discerned on Map No. 2 by the isobaric lines.

TEMPERATURE.

The November temperature has been much lower than usual in New England, and generally lower over the whole country east of the Rocky Mountains. In the Lower Mississippi, the Lower Missouri valleys, and the Gulf States the normal temperature has prevailed. The variation from the normal in the Ohio valley and Tennessee has been very little—1° 2′ below. The thermometric means will be found on Map No. 2, which gives the isothermal lines. The lowest temperature reported (except from mountain stations) was —22° at Pembina.

PRECIPITATION.

Map No. 3 gives approximately the rain-fall for the different sections this side of the Rocky Mountains. The marginal table on the map explains where there has been abnormal excess or deficiency. The official report from Yankton, Dak., shows that there has been hardly any appreciable rain-fall in that section during the entire month. The greatest precipitation was in Southeastern Massachusetts and near Galveston.

RIVERS.

The Red River was highest above low-water mark on the 25th, when its rise was 13 feet 3 inches. The Missouri reached its highest between the 20th and 27th; the Upper Mississippi on the 28th, when it was 5 feet above low-water mark at Saint Paul, and 8 feet 6 inches at Saint Louis. At Cairo, on the 29th, the Mississippi maximum was 14.9

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above low water. At New Orleans, on the 1st, it was 13 feet and 4 inches below high-water mark. The Cumberland, at Nashville, and the Ohio, at Cincinnati, on the 28th, were over 20 feet above low water.

The lowest fall of the Ohio was on the 12th, when at Cincinnati it was 8 feet; that of the Mississippi, on the 19th, at Cairo, 6 feet 6 inches; that of the Red River, on the 20th, at Shreveport, 6 feet 3 inches.

PECULIAR PHENOMENA.

The display of auroras in the Lake region does not seem to have been as frequent or as brilliant as usual; nor have the November cyclonic disturbances been as numerous or as marked as usual during the past month. At New York, on the 22d, the peculiar arrangement of cirrus clouds, known as the "Polar Bands," was reported by the Observer, the "Bands" extending from the southwest to the northeast, covering nearly the entire sky, and apparently converging at the two points mentioned; and the whole attenuated mass was moving rapidly to the northeastward. On the 29th two "mock suns" were observed, one on either side of the sun, at an altitude of about 5°. At Buffalo, on the 1st, the unusual phenomenon of a vivid flash of "blue light" was observed over the Lake, accompanied by a loud report as of a cannon, supposed by the observer to be a "lightning-ball." During the storm of the 17th, the Lake City, Fla., observer reports the electric phenomena very protracted and persistent toward the southeast, showing its connection with the Gulf Stream off the Florida coast. The Nashville observer, on the nights of the 13th and 14th, kept up meteoric observations and saw a number of shooting stars. The Marquette observer, during this month, has conducted an interesting investigation to ascertain what, if any, connection exists between barometric fluctuations and the rise and fall of the water in Lake Superior. The Saint Paul observer, on the 3d, reported the "Bands" of fine cirri at 10.30 p. m., extending from west to east, through which the moon appeared surrounded with two rings, showing the prismatic colors very distinctly. The Lexington, Ky., observer reports unusual smokiness in his section, a phenomenon which has largely extended over the lakes and is a characteristic of the Indian summer.

The first ice at Savannah was formed on the 20th of November. On the 17th the barometer fell .167 of an inch at Leavenworth, and read 29.33, the lowest reading given since last April. The observer at Leavenworth reports first ice floating in the river on the 29th. The enormous rain-fall of 6.35 inches in forty-eight hours, on the 24th, was reported by the observer at Shreveport.

STORM-WARNING SIGNALS.

Seventy-seven cautionary signals were displayed during the month at ports in the United States and forty-four at Canadian ports. The Office has no returns to show how many of the signals displayed at Canadian points were justified. Out of the seventy-seven storm-warnings displayed at United States ports there were four whose justification was doubtful; but the number known to have been *actually justified* was 62. This gives as the percentage of verification 80.51.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

PAPER 48[3].

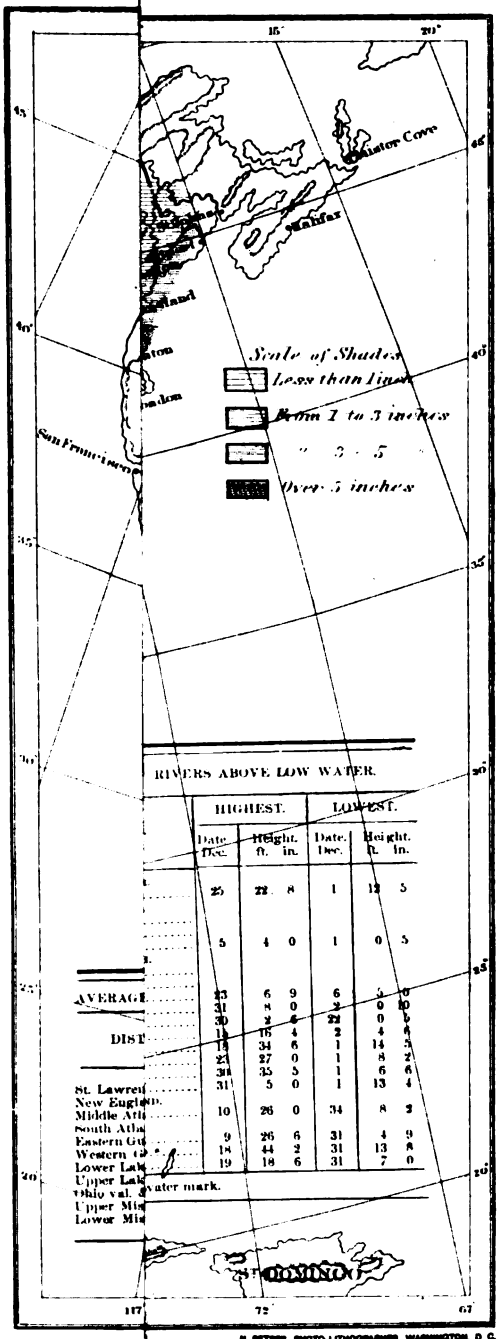
MONTHLY WEATHER REVIEW, DECEMBER, 1873.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

STORMS.

During this month twelve storms, of greater or less severity, have prevailed along or within the borders of the United States. (See Storm Track Chart, No. 1.) Of this number, six have come from the southwest and the region of the Gulf of Mexico, and six from the Northwest and Upper Lake region. The most violent have come from the Southwest and Gulf, and have moved in every instance in a northeastwardly course, four of them keeping to the west of the Alleghany Mountains, and two making their way on the eastern side of this range.

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RIVERS ABOVE LOW WATER.

	HIGHEST.		LOWEST.	
	Date. Dec.	Height. ft. in.	Date. Dec.	Height. ft. in.
	25	22 8	1	12 5
	5	4 0	1	0 5
AVERAGE	13	6 9	6	5 0
	31	8 0	2	9 10
	30	2 6	22	0 5
DIST	13	16 4	2	4 6
	13	34 6	1	14 5
	23	27 0	1	8 2
	31	35 5	1	6 6
St. Lawrence	31	5 0	1	13 4
New England	10	26 0	34	8 2
Middle Atl				
South Atla				
Eastern Gu	9	26 6	31	4 9
Western G	18	44 2	31	13 8
Lower Lak	19	18 6	31	7 0
Upper Lak				
vhile val.	ater mark.			
Upper Mis				
Lower Mis				

R. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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The paths of the storms which approached from the Northwest lie in a southeasterly direction till they attain the eighty-fifth meridian, and then are deflected northeastwardly toward the Saint Lawrence Valley and New England. In discussing these December storms, it should be noted that the intensity of cyclonic action and the amount of barometric depression are strikingly connected with the *progressive* velocity of the storm-centre.

These twelve storms were not all of marked or important features. The following facts are most worthy of notice:

No. I. Apparently originated in Kansas, and advanced northeastwardly over western Lake Superior, with, however, no very high winds or heavy precipitation.

No. II. Rapidly followed No. I, if indeed it was not the main cyclone from which its predecessor was an offshoot. This extensive storm originated in Kansas, on the morning of the 2d of December, and progressed slowly toward Lake Michigan, which it crossed on the morning of the 4th, and thence moved over Lake Huron, attended in its destructive course by winds, having velocities ranging from forty-five to sixty miles per hour. Since 1844, (unless perhaps the "gale" of 1865 be excepted,) no severer storm has been felt over the Lakes. Simultaneously, snow-storms prevailed westward to California, with unusual cold. It would therefore appear that cold northerly winds pressed hard upon the rear of this cyclone, and covered the whole of the trans-Mississippi country. Indeed, the beginning of the widespread disturbance was premonished by a *heavy sand-storm*, December 1, at Yuma; and all along the Gila River, on the night of that day, heavy condensation took place. This storm moved in a northeastward direction, after passing over Lake Huron, and hence it disappeared from beneath the Signal-Service observations.

No. III. Originated, so far as the office observations can decide, in southern Texas, on the 5th, and after approaching the Indian Territory, on the 6th, disappears. It was a very feeble storm.

No IV. Originated in the Upper Missouri valley, on the afternoon of the 7th, and moved during the evening and night to Omaha, whence it passed in a northeastwardly course to Lake Superior. After reaching this Lake, its track lies in a direction almost due east toward the Lower Saint Lawrence Valley.

No. V. First appeared at midnight of the 10th near Duluth, and with a slight southeastwardly deflection of its course, moved toward the Lower Saint Lawrence Valley.

No. VI. Began in New Mexico, and, during the night of the 10th and the forenoon of the 11th, advanced eastward to the central Arkansas Valley, and thence moved northeastwardly over Missouri and Illinois on the 12th. It passed eastward over New York, and reached the Atlantic coast the night of the 13th, and on the morning of the 14th its centre was near Halifax, Nova Scotia.

No. VII. Confined its course very closely to the Lake frontier of the United States. It commenced on the 17th, in the Upper Lake region, and disappeared in Canada on the 18th.

No. VIII. Began simultaneously in the Southwest, and advanced slowly in a direction almost due northeast over the Ohio Valley. It was attended by heavy precipitation and high winds, disappearing near Nova Scotia on the 20th.

No. IX. Commenced on the 21st, near the mouth of the Rio Grande river, and skirting the Gulf coast crossed over northern Florida on the night of the 22d, thence making its pathway along the main axis of the Gulf Stream.

No. X. Began in the Gulf, and on the night of the 24th passed over southern Florida and thence along the Atlantic seaboard. It reached the Nova Scotia coast on the 27th. This gale was followed by heavy snow-storms in New England, the snow falling two feet deep in some places.

No. XI. Began in the extreme Northwest on the 25th, and after pursuing a southeastward course to Lake Erie and New York, bore away in the direction of Nova Scotia.

No. XII. Is first seen on the morning of the 28th on Lake Superior, whence it coursed nearly due eastward along the Lake frontier, but with no very marked effects.

ANTI-CYCLONIC AREAS.

There were eight areas of decided high pressure, which traversed the country during the month. They originated mostly in the Northwest, and preserved a course nearly southeastward toward the South Atlantic States. The only noticeable feature in the anti-cyclonic areas is their variety, their smallness and inferior barometric intensity, as compared with the very remarkable anti-cyclones of December, 1872.

TEMPERATURE.

There has been no deficiency of temperature in any section of the United States furnishing weather reports. On the contrary, (except in the Gulf States, where it was normal,) the thermometer has everywhere ranged from 1°.3 to 8° Fahrenheit above its

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usual December height. The greatest excess of warm weather has been in the Upper and Lower Lake regions. The mean excess in all the sections (see Chart No. 3, Table of Temperatures,) is nearly 4° for the month—an excess much more potential, in its climatic effect, than would appear from the figures.

PRECIPITATION.

The precipitation in the United States for December was decidedly in excess of the usual amount. In the Lower Lake region, the Upper Mississippi Valley, the Ohio and the Lower Missouri Valleys, the excess is most palpable. Elsewhere, save in the Gulf and Middle States, the normal precipitation is reported. Chart No. 2 explains itself. The rain-fall deficiency in the Southwest will not be felt, agriculturally, inasmuch as an excess of rain fell in November.

PECULIAR PHENOMENA AND FACTS.

The observer at Cape May reported on the 19th of December, "at 6 p. m., in the southwest, a flash of lightning, which had the appearance of the explosion of a ball or bomb;" also a great amount of "sheet-lightning." The observer at Pike's Peak, among other interesting observations, notes the peculiar effect of sunset, in these words: "In the distance, to the northeast, a heavy mist was overhanging the plains. On this mist was depicted a perfect shadow and profile of our peak by means of the setting sun. The image is so realistic that one could hardly credit that it was merely a shadow, and not a lofty peak, rising abruptly from the prairie. This continued for the space of fifteen minutes, when it gradually melted away in the mist, as the sun was setting behind the gigantic peaks of the 'Snowy Range.'" At Cape Henry, during the night of December 21, the brig Mary Rice, from Rio Janeiro bound to Baltimore, was wrecked within sight of the new Coast Signal Station. The observer, by promptly telegraphing to Norfolk, procured help, and the entire cargo was secured and the ship saved. At Lexington, Ky., a "Lunar rainbow," with the prismatic colors, was seen on the night of the 1st. In the storm of the 4th, at Toledo, the river was nearly emptied of water by the wind, and buildings were damaged to the extent of $75,000. Auroral displays have been rare during the month and very faint. A "Mock Sun" was observed at Saint Paul, Minn., on the 4th, and a beautiful "Parhelic circle" on the morning of the 29th. Much lightning and thunder were reported from the Upper Mississippi valley, showing the presence of the great equatorial air-current.

The amount of fog which prevailed in the United States in December was very great, and is probably due to the fact that neither the great equatorial nor the broad polar current has been established over the country, but, rather, both currents brought into juxtaposition on its eastern side.

In the latter part of November, vast prairie-fires occurred in the far West, and several *dust-storms*, filling the air with fine and impalpable particles, which are known to remain suspended in the air for many days, and sometimes are finally precipitated with water, forming the celebrated "*black rain.*"

The hail-storm at Nashville on the 18th was so sudden in its approach that none suspected it, and the streets were lined and thronged. The hail-stones were about the size of almonds, and generally very smooth and even in form, and covered the ground to a depth of an inch. The hail-storm originated with a smooth sheet of stratus cloud, supplanting a low-moving scud, and a sudden shift of wind from south to northwest.

THE RIVERS.

These will be seen in the table on the precipitation chart, (No. 2,) right side. It will be observed there was an extraordinary rise in the Mississippi, at Cairo, Memphis, and Vicksburg, from the 18th to the 30th of December. This was caused by the enormous floods in the Ohio and its tributaries from the 9th to the 18th ultimo, on which last-named day the Ohio was 44 feet and 2 inches above the low-water mark. It will be seen from the table that all the Western water-courses have been full during the past month—a fact which gives promise for the next season's agricultural yield.

The excessive rains which found their way early in December to the Upper Ohio, were probably due to the projection of the cold polar current in the rear of the great storm of December 3 and 4, already described. The cold current served to condense the vast floating reservoirs of vapor which the cyclone had drawn to its eastern side and front from the Gulf of Mexico.

CAUTIONARY SIGNALS.

During the month of December, there were hoisted at American ports sixty-three cautionary signals, and for Canadian ports thirty-four storm premonitions were telegraphed.

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The display of Cautionary Signals on the Lakes was suspended after the 10th of December, by which time navigation was entirely closed.

Out of the whole number of storm-warnings displayed at all American ports, four are doubtfully justified, but the number known to have been *actually justified* is forty-seven, which gives as the percentage of verification 73.43. The office has no returns to show how many were verified at the Canadian ports.

The display of these Signals at the various ports was generally respected; and the confidence in their accuracy may be seen by the reports of their reception, of which a few specimens may be given: Thus at Alpena, Michigan, when on the 1st a storm-signal was displayed, "steamers in port delayed going out till morning of the 2d." At Boston, Mass., December 26, after signal was displayed, "all shipping remained in port." At New Haven, December 23, "the warning attracted considerable attention in the city, owing to the subsequent snow." At Wilmington, N. C., December 26, "the signal was generally heeded by mariners and those engaged in shipping-business." Similar reports frequently come from Chicago and other sea-ports.

Published by order of the Secretary of War.

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PAPER 48[4].

MONTHLY WEATHER REVIEW, JANUARY, 1874.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

A general summary of the Meteorological Observations taken under the direction of the Signal Service during the month of January, 1874, is presented in the accompanying Charts and Tables.

In reviewing the meteorological condition therein indicated, the most noticeable feature is the excess of mean temperature throughout almost the entire country over that of the corresponding period in previous years, the most marked difference being between the mean temperature of January, 1873, and that of January, 1874.

This average temperature in the several districts, together with the excess, may be found by reference to the table accompanying Chart No. 2, where it will be seen that the excess is greatest near the region of mean low barometer, apparently central over Lower Canada. The area of mean high barometer being central off the South Atlantic coast, the prevailing winds to the west of it were therefore southerly, bearing the aqueous vapor from the Gulf of Mexico and Atlantic coast toward the region of low barometer. An excessive humidity in the atmosphere was therefore produced over the greater portion of the United States east of the Mississippi River. The unusual supply of vapor thus diffused over the country prevented a great loss of heat by terrestrial radiation, and tended to increase the mean temperature for the month.

STORMS.

The movements of those areas of low barometer which produced a definite cyclonic condition of the atmosphere are traced on Chart No. 1, and are numbered in the order in which they occurred. Although treated of under the general title of storms, the atmospheric disturbance, in several instances, was not sufficiently violent to warrant the use of this term.

The first storm that occurred during the month is of particular interest, as it has been traced directly from the Upper Missouri Valley to the Atlantic coast. This storm was preceded by gales on the Pacific coast during the 30th and 31st days of December, and the approach of the atmospheric disturbance was indicated by the rapid fall of the barometer, with heavy rain, at Portland, Oreg., and San Francisco. The southerly winds which prevailed upon the coast show that the center of the disturbance passed to the eastward north of Vancouver's Island.

The midnight report of January 1st announced an area of low barometer in the Upper Missouri Valley, as noted on the chart. From this point the direction of the storm was southeastward, following the course of the Missouri River as far south as latitude 45°; after which its general course was eastward over the mean latitude of 47°. It was accompanied by rain and snow from the Mississippi River to the Atlantic coast, north of the Ohio Valley, from the 2d to the 4th of the month. As this area of disturbance

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passed to the eastward, its velocity increased, with a gradual rise of the barometer—conditions which do not usually obtain in storms in this latitude.

It was followed by decidedly cold weather, first in the northwest and a "Norther" on the coast of Texas, the temperature at Fort Gibson falling from 73° to 15°, and the barometer rising 0.9 of an inch during the night of the 3d. This "Norther" continued, with snow and freezing weather, until the 6th.

II. This storm was first defined in the Gulf of Mexico, its approach being indicated by the general direction of the isothermal lines in the Southern States.

It appears to have had an equatorial origin, and to have described the northern half of its parabolic track within the limits of our observation. The general course of the center of disturbance was parallel to the coast-line, and the region of precipitation extended from the Atlantic coast to the Mississippi Valley, and from the Gulf to British America. It was this storm which produced the snow and sleet in the Lake region and Ohio Valley on the 6th and 7th of the month, and severed the telegraphic communication between the East and West. The form of the area of least pressure during the 7th of the month, and while the storm was passing from North Carolina to Western Pennsylvania, was that of an ellipse, with the major axis in the direction of progression. This feature is noted, for the reason that several attempts have been made to show that these storms are *always* elliptical in form, and that the major axis is *always* perpendicular to the course of the storm, whereas, in the present instance, the center of depression became circular in form as it passed into the Saint Lawrence Valley, from which region it passed to the northeast over the mean line of atmospheric progression for the eastern portion of the United States.

III. Passed to the north of the United States, and was at no time wholly within the limits of our observation. The center of depression was approximately marked on each of the tri-daily reports from the afternoon of the 8th to the morning of the 11th, during which time the southern half of this disturbance extended as far south as the Ohio Valley and the Middle States, producing rain or snow in these regions and the Northeast.

IV. Originated in the Mississippi Valley, and was first marked as central in Missouri on the morning of the 13th. It moved to the eastward with a mean velocity of 50 miles per hour, without producing high winds, except on the eastern coast.

During the 15th and 16th of the month a severe storm prevailed on the Pacific coast, extending from Central California to the west coast of British America, and the barometer fell to the unusual reading of 29.06 inches at Portland, Oreg.

Reports received from vessels in the Pacific previous to the above dates indicate that this storm existed as a severe northerly gale in latitude 30° 18′ N., longitude 145° W., January 13, and as a northeasterly gale in latitude 37° 15′ N., longitude 156° 26′ W., on January 14, when the barometer fell to 29.46 inches. This storm is not traced upon the chart, because it passed to the north of the United States without any unusual disturbance, except in the Upper Lake region and north of Minnesota, the barometer at Fort Garry falling to 29 inches, the lowest reading noted during the month.

V, VI, VII and VIII developed west of the Mississippi River and moved eastward, accompanied by rain or snow, without producing high winds, the last named presenting the unusual condition of developing and wholly disappearing within the limit of our stations, notwithstanding the atmosphere had assumed a definite cyclonic movement.

WINDS.

The mean direction of winds at the several stations is represented on Chart No. 2 by the arrows, and it will be observed is generally toward the area of low barometer.

Apart from the storms already described, no high winds were reported except almost continuous gales at Pike's Peak. During the month of January thirty-five Cautionary Signals were ordered on the Atlantic coast, embracing those stations between Eastport and Wilmington, and five telegraphic warnings of the approach of storms were sent to Canadian ports. Out of the whole number of signals ordered at the American ports, twenty-eight have been justified by the occurrence of dangerous winds at or within one hundred miles of the station at which the signal was ordered.

The observer at Norfolk reports that no vessel attempted to leave the port during the display of signals.

The observer at New Haven reports that the signal on the 7th attracted general attention, as it was ordered twenty-four hours before the dangerous winds occurred.

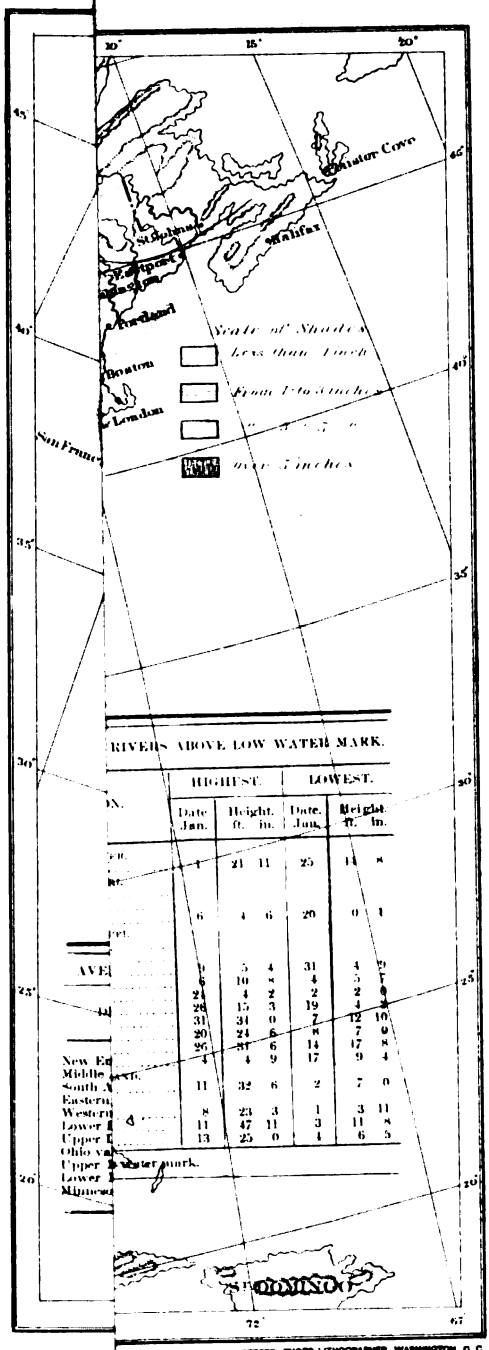
The signals ordered at Eastport were not verified by the occurrence of winds; but dense fogs prevailed, rendering navigation dangerous.

TEMPERATURE.

The general distribution of temperature throughout the United States is indicated by the isothermal lines on Chart No. 2.

The table will show that there has been an excess in all the districts, except Minnesota, where it has been normal. The greatest excess has been in the regions of greatest

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precipitation. The range of temperature has been greater than usual in the Southern States. On the precipitation chart will be found the lines marking the southern limit of snow and freezing weather. The mean temperature, as calculated from the observations made at the three stations on the Pacific coast, is but slightly in excess of the mean for the same period in previous years.

PRECIPITATION.

Chart No. 3 is a graphical representation of the precipitation in the several districts. The local nature of rain-fall, together with the limited number of stations, renders this Chart only approximately correct. Probably the most interesting feature is the excess of rain-fall on the Pacific coast, and its influence on the agricultural interests of that section.

A comparison of the annual wheat-crop with the annual-rain-fall shows that the yield has been largest in those seasons in which rains have been most abundant. The amount of rain-fall for the past six months is largely in excess of the average, and would appear to indicate a bountiful harvest for 1874.

RIVERS.

Freshets and floods have been reported in the rivers draining the Appalachian Chain, and in those of New England and the Middle States during the 8th, 9th, and 10th days of the month. The Ohio River has been unusually high at Cincinnati and Louisville, but has been open during the entire month. Fluctuations, without any decided high waters, have occurred in the Mississippi and Missouri Rivers. The latter has been closed during the entire month above Leavenworth. The Mississippi River was filled with floating ice at Keokuk from the 5th to the 13th, was closed from the 14th to the 15th. Ice disappeared on the 19th, and re-appeared again on the 28th.

At Saint Louis the river was closed from the 11th to the 15th, opened on the 18th, and ice disappeared on the 27th.

At Saint Paul it remained closed during the entire month.

Heavy freshets, causing great loss of property, have been reported from Buffalo.

FACTS AND METEOROLOGICAL PHENOMENA.

Meteorological observations have been continued at Pike's Peak during the month of January, the station being situated about 14,000 feet above the level of the sea. The monthly means, determined from the three daily observations, taken, respectively, at 7 a. m., 2 and 9 p. m., are as follows:

Barometer,	29.80, mean.	30.16. highest.	27.32, lowest.
Temperature,	6°.1 "	23° "	—25° "
Relative humidity, .53.			

In comparing the oscillations of the barometer with the changes of temperature, it has been found that the temperature rises with an increase of pressure.

The observer reports peculiar bands of cirri at 4 p. m. on the 10th a little north of the zenith, extending from WNW. to SSE., converging near the horizon, and having a breadth of 5°. These remained stationary for about an hour, and were finally obscured by fine cirro-stratus clouds or haze.

Numerous auroral displays have been reported from stations north of the fortieth parallel of latitude, the time of occurrence being generally between 8 and 10 p. m. The frequency of these displays apparently depends upon the position of the station in the auroral zone. Those occurring at Boston, New York, Alpena, Duluth, and Breckinridge, between the 15th and 20th, are especially noted as peculiar and brilliant. The observer at Detroit reports evidences of the atmosphere having been charged with electricity on January 21st, the telegraphic instrument working with the batteries disconnected. The observer at Long Branch reports the appearance, at 2.10 p. m., on the 4th, of a well-defined "Fog-bow" in the North. He says: "This bow was larger than the usual rainbow, and was perfectly white. It occupied the same position in the horizon that a rainbow would at that hour of the day." The observer at Boston reports that on the 15th light snow fell from a cloudless sky.

The lowest temperature reported from any station during the month was —33°, at Breckinridge, Minn., on the 24th. The highest barometric reading telegraphically reported during the month was 30.98 inches, at Pembina, Dak., January 29; and the lowest, 29.00, at Fort Garry, Manitoba, on the 17th.

Published by order of the Secretary of War.

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PAPER 48[5].

MONTHLY WEATHER REVIEW, FEBRUARY, 1874.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

The atmospheric changes during the month of February appear to have been controlled to an unusual degree by the influence of the nightly radiation, especially that between the midnight and morning reports. Illustrations of this are found in the rapidity with which areas of rain and snow have extended during those hours, and of which a striking instance is found in the heavy snow-fall of the morning of Wednesday, February 25. At the preceding midnight, rain apparently prevailed from Norfolk to Cairo and southward, while cloudy weather extended over the Middle and Atlantic States. The northern limit of the area of rain had moved northward 250 miles between 4.35 p. m. and 11 p. m. of the 24th, but by 7.35 a. m. of the 25th an area of snow prevailed for about 350 miles further northeast, and extended again another 350 miles by 4.35 p. m. of the same day. This rapid extension northward was apparently the consequence of direct radiation during the night, in consequence of which a feeble barometric depression was caused in the Ohio Valley, while storm No. XII was drawn all the more rapidly northwestward toward the Middle Atlantic coast.

STORMS.

An unusually large number, namely, twenty-two, of barometric depressions have been noted during February, but of these only the following twelve have seemed worthy of representation on the storm-map—most of the others being subsidiary to these, or only appearing on the extreme limits of the weather-map. It will be seen that the (for February) unusual number of four important storms, of which two were violent hurricanes, have moved up the Atlantic coast, while three have also pursued a parallel course on the west side of the Alleghanies, and but three have been traced directly eastward over the extreme Northwestern Territories and the Lake region.

The storms peculiar to the Gulf Stream would seem to have pursued tracks lying, on the average, somewhat west of their usual course.

This distribution of the storm-tracks is a sufficient indication of the peculiar character of the weather for this month, and the study of the reports received by mail from the Bermudas, as well as of the logs of vessels, shows the extreme importance of these islands as an outpost for the anticipation of such storms as advance northward upon the New England coast.

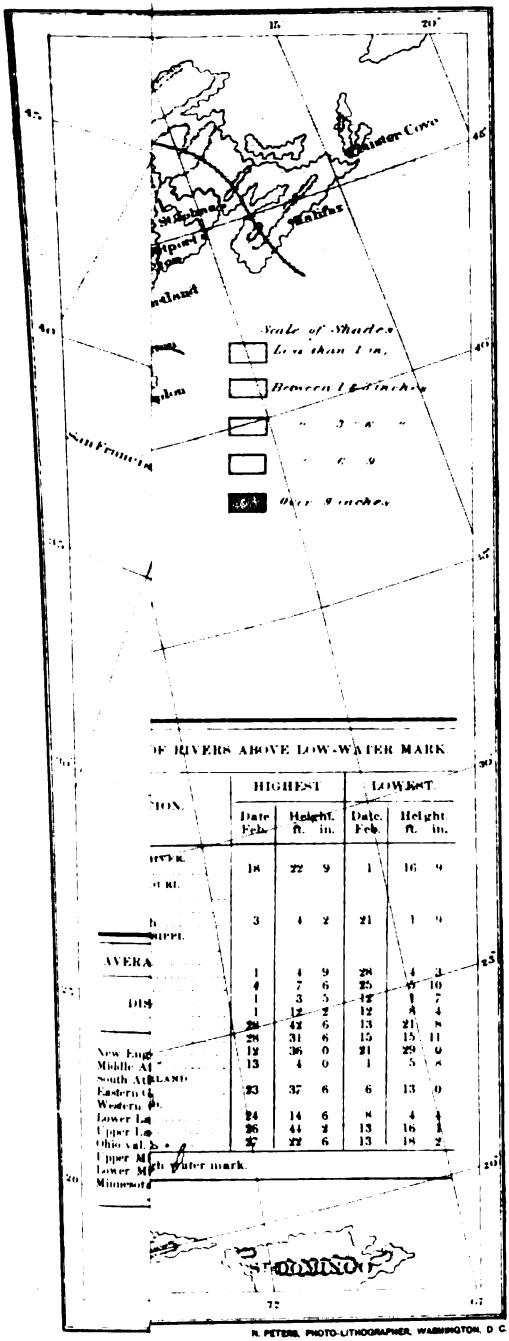
I. This storm was apparently in Texas on the 31st of January, and on the 1st of February was in Louisiana, and was already followed by the customary cold weather on the Texas coast. In its advance northeastward to the Lower Lakes, it was preceded by a high barometer and cold northeast wind in the Middle and East Atlantic States. This mass of cold air seems to have underrun and uplifted the warmer air of the South Atlantic States, and extended as a cold northeast rain southward to Florida by the evening of February 2d. While this low barometer was, on the 2d, in the Ohio Valley, another storm-centre existed between the Atlantic coast and the Bermudas.

II. This developed on the 2d, in consequence of the heavy precipitation in Georgia and Florida, caused by the north winds previously alluded to. After passing eastward off the land, it followed the trend of the coast, as shown by the Bermuda reports, until t passed near Nova Scotia on the 4th. The amount of barometric depression at its centre appears to have slowly increased in the course of its progress.

III and IV. This disturbance appears first in Southwestern Texas, and may have owed its origin to the westward flow, up the slope of the plains of Texas and Northern Mexico, of the surface air forced from the Gulf of Mexico by the high pressure then existing in the Gulf and Southern States. Throughout the 3d and 4th instant slowly increasing cloudiness was reported from the western gulf coast, while, as usual, the upper clouds moved toward the centre of higher pressure. There are no reports to show whether there also existed on the west of the Mexican Cordilleras any area of low pressure that would further intensify the action going on in Texas. The storm-centre, having in its eastward course left Texas on the 5th, was immediately followed by a moderate "Norther," and while itself passing rapidly northward to the Ohio Valley, gave rise on the 6th to southerly winds and heavy rain or snow in the South and Middle Atlantic States, over which there also appeared several temporary barometric depressions—one of which developed by midnight of the 7th to a well-marked storm on the coast of Virginia.

The growth of No. IV was attended by the gradual disappearance of the original storm-centre. Southwest winds prevailed at the Bermudas while it was near Cape Hatteras; northerly winds, with rain, prevailed before and after.

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OF RIVERS ABOVE LOW-WATER MARK.

ION.	HIGHEST				LOWEST			
	Date Feb.	Height. ft.	in.		Date. Feb.	Height. ft.	in.	
	18	22	9		1	16	9	
	3	4	2		21	1	9	
	1	4	9		28	4	3	
	4	7	6		25	6	10	
	1	3	5		12	1	7	
	1	12	2		12	8	4	
	28	42	6		13	21	8	
	28	31	6		15	15	11	
New Eng	12	36	0		21	29	0	
Middle Al	13	4	0		1	5	8	
South Al								
Eastern G	23	37	6		6	13	0	
Western								
Lower La	24	14	6		8	4	1	
Upper La	26	44	2		13	16	1	
Ohio val	27	22	6		13	18	2	
Upper M								
Lower M								
Minneso								

ch water mark.

R. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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V. This storm first appears on the map as a region of rain on the 7th of February, southwest of Florida. There was at this time a cold northerly current flowing over Louisiana and Northern Florida, and it seems not improbable that this contributed to the formation in the southeastern part of the Gulf of Mexico of the rainy area attending the development there of the low barometer. After crossing the peninsula of Florida the storm-centre moved northeastward, not far from the South Atlantic coast, preceded by a northeast gale at Capes Henry and Hatteras. On the morning of the 11th this storm-centre appears quite near to Cape Breton, where the barometer was at that time reported 28.78, being the lowest that has occurred during the month. This cyclone was productive of great destruction upon the sea, as shown by the reports that have come to hand, of over one hundred vessels, collated from the columns of the New York Herald. Of these, the following give the approximate places in which they met the storm:

On the 8th—

S. S. Morro Castle, E. of Frying-Pan Shoals.
Schr. Ricardo, lat. 31°, lon. 79°.
Brig E. H. Flynn, lat. 29°, lon. 79° 20′.
S. S. Ætna, 200 miles S. of Hatteras.

On the 9th—

Bark Saide, lat. 32°, lon. 70°.
Brig Hail Columbia, lat 33° 48′, lon. 73° 16′.
Bark La Platte, lat. 32° (†), lon. 67° 15′.
S. S. Montgomery, S. of Cape Hatteras.
Sch. Jos. W. Wilson, lat. 31° 15′, lon. 79° 20′.
Brig Isabel Cain, lat. 34° 30′, lon. 69° 30′; barometer fell to 28.80.

On the 10th and 11th—

Bark Jason, lat. 38°, lon. 68°.

On the 11th and 12th—

S. S. Weser, lat. 43°, lon. 56°.

On the 12th—

S. S. Maas, lat. 45°, lon. 48° 40′.

On the 13th—

S. S. Wyoming, 2 days W. of Liverpool, February 1 to the 13th.
S. S. City of Montreal, 2 days W. of Liverpool, February 11 to the 13th.

VII. During the evening of the 11th and morning of the 12th the barometer fell, with light rain, in California and Oregon. This was followed on the 12th by rapid fall, with southeast winds throughout the country immediately east of the Rocky Mountains, and the formation of a long elliptical area or trough of low pressure which soon broke up into three or more circular areas, of which the most important has been indicated as No. VI. The pressure in Oregon, however, continued quite low and falling, showing that the main depression was moving slowly northeastward toward British Columbia. By the evening of the 13th, this had finally passed into Montana, but appears not to have had there the characteristics of a severe disturbance. It was central on Lake Superior on the morning of the 15th, and on the Gulf of Saint Lawrence on the 17th. The barometer was quite low at the Bermudas on the 16th, 17th, and 18th, and was followed by northerly winds, low temperatures, and heavy rain.

VIII. The morning map of the 16th shows a decided depression west of Texas, which probably originated west of the Cordilleras, possibly in the equatorial portion of the Pacific Ocean, as Mr. Redfield has shown to be frequently the case with the storms that arrive on the Mexican and California coasts. This storm-centre moved quite slowly eastward, influenced, no doubt, by the area of moderately high barometer and cold air over the Lake region and Ohio Valley. On passing beyond the coast of Georgia it seems to have given rise to at least two areas of special precipitation and possibly low pressure, one of which existed in Florida on the morning of the 18th, while the other was east of South Carolina. The Bermuda reports indicate that both of these passed northeastward, without important development.

IX. On the 16th and 17th the falling barometer, clouds and rain at San Francisco and Portland, Oreg., indicated the approach of areas of low pressure, of which the one represented as No. IX, passed within the cognizance of the office, while others kept to the northward. This storm-centre apparently passed eastward over the northern part of California into Nevada and Idaho, where it was central on the 18th, and there co-operating with a smaller storm-centre to the northward, produced what threatened, on the morning of the 19th, to be an unusually severe disturbance; this, however, passed northeastward over Lake Superior, and was only especially notable by reason of the northwest gales in Minnesota and Dakota. The steady southerly winds induced over the Lower Lakes, Middle and East Atlantic States brought steady light rains to those sections.

X. While the previous storm-centre was, on the 19th, in the extreme northwest, the induced southeasterly winds in Texas prepared the way for the formation of an independent area of precipitation and low pressure in Texas, the existence of which was, as usual, determined by the nightly radiation; its centre on the morning of the 20th was probably in Northwestern Texas. The rain-area extended very rapidly, by midnight, over the Ohio Valley to Western Pennsylvania. The remarkable contrast of temperature noted in a subsequent portion of this review formed the most notable features of the storm-centre, which soon seemed to die away.

XI. The belt of isotherms above alluded to as originating on the dissolution of storm

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No. X, seems to have lasted until the development of No. XI disturbed its arrangement. The passage of No. IX from the Pacific coast had been followed on the 21st by the area of highest barometric readings that appeared on that coast during the month. The cold northerly winds from this area of high barometer prevailed over the Lower Missouri, Upper Mississippi, and Ohio Valleys, and in Texas on the morning and afternoon of the 21st, apparently there formed in consequence some precipitation in Southern Texas and off the Texas coast, for by midnight the coast-winds have veered to south and east, with rising temperature. During the whole of this night the rain-fall was quite large in Tennessee, and the area of lowest pressure, after moving into that State, extended simultaneously and rapidly to the northeast and northwestward, and on the morning of the 23d was represented by two depressions, respectively over Upper Michigan and the Lower Lake region. The former disappeared from the cognizance of the signal-stations, and the latter passed over the mouth of the Saint Lawrence River.

XII. The cold northerly winds attending the high barometer that followed the preceding storm seem to have underrun the warmer and moister air of the Gulf and the Atlantic between latitudes 25° and 30°, so that already on the morning of the 23d the Texas "Norther," and its feebler representative in Alabama, were attended by the invariable upper southerly cloud-bearing current moving toward the centre of low temperature and high barometer. During the 24th there appeared traces of an incipient storm-centre in the northern portions of the Gulf, while cold north and northeast winds, with sleet, rain, and high barometer, prevailed on the South and Middle Atlantic coasts, probably indicating the simultaneous development, in a similar manner, of a storm-centre at some distance east of the Carolina coast. On the 25th this latter centre had moved on to the coast of New Jersey, while the depression in the Gulf of Mexico had moved eastward over the Florida peninsula and disappeared, possibly uniting with its predecessor.

The storm-centre then advanced rapidly northeastward along the New England coast; it was, in the afternoon of the 26th, east of Cape Breton. This storm appears to be the same as that experienced by the steamer Donau, which met a violent hurricane shortly before reaching New York on the 27th. The same hurricane was also met by the steamships Russia, City of Dublin, Wisconsin, and Andes, and the latest report received concerning it is from the steamship Pennsylvania, which experienced a violent hurricane at midnight of the 27th.

CAUTIONARY SIGNALS.

There have been displayed during the month at stations in the United States ninety cautionary signals, while to the Canadian stations forty-two storm-warnings have been sent. Of these latter the tri-daily weather-maps show with more or less certainty that twenty were verified by the storm-winds following within twenty-four hours after the observations were made upon which the warnings were based. Of the remaining twenty-two signals, eighteen appear not to have been verified, while two orders, classed as late, were sent after the winds had become dangerous, because it was anticipated that these would so continue for some time; concerning the verification of two others, no information is at present available. Of the ninety signals displayed at stations in the United States, twenty-three are classed as late, the orders having been issued immediately on the reception of the news of unexpected strong winds; other twenty-three are reported by the observers as not verified at the station, but of these twelve appear to have been verified within one hundred miles thereof, leaving fifty-six signals, or sixty-two per cent., verified. Three cases are reported in which dangerous winds prevailed for a short time without the display of signals.

BAROMETIC PRESSURE.

The isobars given on Map No. 2 show that the area of high pressure on the Pacific Ocean has encroached upon the coast of California; on the other hand, the area of high barometer over the Atlantic Ocean has apparently extended somewhat farther eastward than usual. The lowest pressure is found on Lake Superior.

TEMPERATURE.

The temperature during this month has been about the average of many years past, the most decided departure being in Minnesota, Wyoming, and Colorado. On the 24th, in the latter Territories, the thermometer indicated the lowest temperature ever recorded there, it being —24° at Cheyenne, —17° at Colorado Springs, —9° at Denver, and 0 at Santa Fé.

The isothermal lines for the month are given on Map No. 2. In drawing these, some use has been made of the observations made by the corps of voluntary observers reporting to the Signal-Office.

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The southeastern side of a region of cold air and high barometer generally presents cases of extreme contrasts of temperature, and such have been quite frequent during this month. The most remarkable instance was noted on the afternoon of February 22, and it is worthy of special attention, since similar cases have occurred but three or four times during the last three years. On the date in question a line drawn northward through Louisiana to Vicksburg; thence northeast to Baltimore, and thence southeast to the Atlantic Coast, separated the area of cold northeast winds and rain on the northward from that of warm southwest winds to the southward. This belt of great thermal contrasts had existed on the 20th, and extended slowly eastward until the 23d.

The greatest contrast recorded is found in the Middle Atlantic States, although probably parallel cases occurred at other places where the Signal-Office has no stations. At New York the temperature of 41°, with northeast winds, is first recorded on the 21st at 7.35 a. m., and continued uniformly until the 23d, 7.35 a. m. At Philadelphia there were northeast winds, temperature 44°, on the 22d, 7.35 a. m., and continuing uniformly until the 23d, 7.35 a. m.; at Baltimore northeast winds, temperature 58°, on the 22d 11 p. m. This is the only northeast wind reported at Baltimore. During the three days in question Baltimore, as also always Washington, experienced only warm southwest winds.

On the 21st, 4.35 p. m.	*On the 22d, 4.35 p. m.*	*On the 23d, 7.35 a. m.*
New York, wind E., temp. 51°.....	Philadelphia, wind NE., temp. 47°.	Philadelphia, wind E., temp. 41°.
Philadelphia, wind SW., temp. 67°.	Baltimore, wind SW., temp. 73°.	Baltimore, wind SW., temp. 62°.

It thus appears that at these stations, as also along the entire belt from Louisiana to New Jersey, cold north and east winds met, and perhaps, to a slight extent, underran the warm south and west winds, the contest between the two being maintained with great uniformity for 48 hours. The examination of the movement of the upper clouds, as far as they could be observed when the belt was most distinctly marked on the afternoon of the 22d, shows that while the crowded isothermal lines bounded the regions of north and south surface winds, they also bounded the regions, respectively, of the northeast and southwest upper currents, into which directions the surface winds were respectively turned after their ascension. The heaviest rain seems to have been falling on the north side of the dividing belt at the time of each report. As has been mentioned in the study of the storm No. XI, this belt of isotherms disappeared on the development of that storm-centre.

PRECIPITATION.

The monthly chart of precipitation shows that there has been a very great excess in the South Atlantic States, and a decided excess in the Western Gulf States and the Ohio Valley. In compiling this chart, use has been made of the reports of voluntary observers, in addition to those of the Signal Corps.

On the 21st and 22d, at Nashville, there fell 5.96 inches in 36 hours, being the heaviest rain-fall ever recorded there.

RIVERS.

The Missouri River at the end of the month was at about the same height as at the beginning, both at Leavenworth and at Saint Louis, having in the interval risen and again fallen from 1 to 3 feet. The Ohio fell, with but slight interruption, until the 13th of the month, when a sudden rise of about 8 feet occurred in the upper portion of the river, producing by the 20th a rise of 15 feet at Cincinnati. The extensive rain of the 23d and 24th, throughout the Ohio Valley, caused a very general rise, which was especially marked at Nashville. At the close of the month the river stood at Cincinnati, Louisville, and Cairo from 8 to 12 feet above its position at the middle of the month. The Upper Mississippi has varied but slightly, and at the close of the month averaged about 1 foot lower than at the beginning; below Saint Louis it has varied considerably, and at Cairo, Memphis, and Vicksburg closed from 4 to 6 feet higher than at the beginning of the month. The wave of high water which, on the 28th, was passing Cairo and Memphis, had not at that time reached Vicksburg.

ICE IN RIVERS, ETC.

During the month the ice has averaged 16 inches in thickness at Dubuque, and 21¼ at La Crosse. At Keokuk the river was clear of ice on the 11th and 27th, but full of thin ice at the other days of observations. At Detroit on the 12th the river was almost free of ice. At Toledo the ice broke up on the 15th. At Buffalo the river and lake continued frozen during the month. At Rochester, at the beginning of the month, the ice was from 6 to 8 inches thick, and at the close from 12 to 18 inches.

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TEMPERATURE OF THE WATER.

But five stations have sent reports of the temperature of the water in the rivers The ranges are as follows:

	Maximum.	Minimum.
Leavenworth	33°	32°
Nashville	53	39
Knoxville	51	41
Montgomery	61	47
Shreveport	57	48.5

At stations on the Atlantic and Gulf coasts the ranges have been as follows:

	Maximum.	Minimum.
Galveston	65°	51°
Mobile	60	52
Jacksonville	66	57
Wilmington	54	42
Norfolk	56	37
New York	36	31
Wood's Hole	34	29
Portland, Me	34 (?)	29

FROSTS.

Frosts are reported at the following stations:

On the 3d, Shreveport; 4th, Cairo; 5th, Savannah; 8th, Shreveport; 10th, Montgomery; 24th, Shreveport.

SOLAR AND LUNAR HALOS.

Solar or lunar halos have been recorded as follows: On the 2d, Santa Fé and Oswego; 4th, Atlantic City and Long Branch; 9th, Santa Fé; 10th, Eastport; 11th, Eastport; 14th, Washington; 19th, Eastport and Breckenridge; 20th, Atlantic City; 21st, Breckenridge and Duluth; 22d, Wytheville and Breckenridge; 24th, Cairo, Escanaba, Dubuque, Norfolk, Eastport, Albany, Barnegat, and Saint Paul; 25th, Saint Paul, Breckenridge, and Omaha; 26th, Duluth, Marquette, Buffalo, Oswego, Sandy Hook, Wood's Hole, Albany, Barnegat, Norfolk, New Haven, Philadelphia, Atlantic City, Lynchburg, Rochester, Grand Haven, and Washington; 27th, Keokuk, Davenport, Omaha, Dubuque, and Washington.

POLAR BANDS.

Notable arrangements of cirri-clouds, in what are called polar bands, were recorded as follows: On the 5th, at Saint Paul; 8th, Atlantic City; 14th, Saint Paul and Washington; 21st, Norfolk; 23d, Sandy Hook; 26th, Norfolk.

AURORAS.

Auroral displays have been generally quite faint. They have been observed at the following stations: On the 5th at Burlington, Eastport, Boston, Albany, Long Branch, Alpena, and Rochester; 7th, Eastport, Marquette, and Alpena; 14th, Eastport, Burlington, Rochester, Erie, and Breckenridge; 17th, Burlington, Alpena, and Marquette; 18th, Boston, and at Lake City "an anomalous luminous appearance;" 20th, Eastport.

ATMOSPHERIC ELECTRICITY.

Remarkable earth currents were noted on the 25th at Breckenridge. Thunder and lightning storms were experienced on the 5th at Galveston; 6th, Mobile; 17th, Montgomery, Charleston, and Augusta; 21st, Cairo and Shreveport; 22d, Shreveport; 28th, Atlantic City.

MISCELLANEOUS.

An earthquake was experienced at Eastport at 10.50 p. m. on the 27th. The trembling lasted three or four minutes.

The migration southward of flocks of wild ducks was noted on the 11th at Saint Louis, and 24th at Morgantown.

A bright metor was observed February 1st, at Atlantic City.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen. (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

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PAPER 48[6].

MONTHLY WEATHER REVIEW, MARCH, 1874.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

The weather for the past month has been, in almost all parts of the United States, an easy transition from winter to spring. The only instances of abnormal weather have occurred in the northernmost portion of the country. The winter temperatures and other meteorological conditions have been generally quite evenly balanced with those of early spring. These conditions are reviewed below in detail.

STORMS AND CYCLONES.

The month of March has been characterized by its usual storminess. Twelve noticeable depressions have passed over more or less of the territory of the United States. The following details sufficiently describe them. (See Storm Track Chart No. 1.)

No. I. This disturbance originated apparently in the Western Gulf States on the last night of February, and moved nearly due eastward, expanding its area of depression, and passing off the Georgia coast at midnight of March 1st. It was attended by no serious consequences.

No. II. This second storm-area of the month entered the United States on the 1st of March, from the northwest, and was marked by a very low barometer. Its track was, however, so high in latitude that its effects were not much felt.

No. III Was of more cyclonic force, and passed from the southwest to northeast directly over the country. It started from Kansas on the morning of March 3d, and reached the Saint Lawrence Valley on the morning of the 4th. From Montreal its course was eastward, and it disappeared off the coast on the 5th.

No. IV Approached from the southwest on the evening of the 5th, and pursued a northeastward course steadily until it reached the Saint Lawrence Valley. It made a slight detour to the northward, crossing the Upper Lakes on the 7th, and thence advanced in a line nearly due eastward. After reaching the Lower Saint Lawrence Valley on the afternoon of the 8th, it paused and remained stationary, or nearly so, until the 12th—a fact most extraordinary in the progressive movements of storm-centres.

No. V. While No. IV was in progress across the country a smaller storm-centre was formed in Virginia on the night of the 6th, and advancing up the coast in a northeasterly direction, appears to have passed beyond the Nova Scotia coast on the 8th, or else to have merged into the larger storm, (No. IV,) which was then coming very near to its track.

No. VI Commenced in the southwest on the 9th and moved over the Southern States, its track on the 11th being deflected from Central Alabama to Northern Florida, whence it disappeared to the eastward on that day.

No. VII. Although this storm-centre appears to have been formed in the shape of a long trough, lying north and south, west of the Mississippi Valley, and in the northwest, early on the 14th, it does not appear in concentrated force until the midnight of the 15th. Then it commenced moving slowly southeastwardly from Dakota to Iowa and Northern Missouri, which latter district it reached on the afternoon of the 17th. Thence its course is at right angles to its earlier track as it passed from Missouri to Michigan on the 18th, and, on the 19th, rapidly bore away to the Lower Saint Lawrence Valley, which it traversed during the night of the 19th, and next morning had disappeared. While the main storm-centre was in Eastern Missouri, and making a northward or northeastward curve in its course, there was formed a severe storm or tornado in the Mississippi Valley, which, at 4 a. m. of the 18th, swept with great fury over Cairo, Ill. It was accompanied by violent lightning and thunder and heavy rain, but no very remarkable oscillation of the barometer was reported. Great damage was done to property by this apparently local whirlwind. Simultaneous, but less violent, disturbances took place in Memphis, Tenn., and the vicinities.

No. VIII Was of little importance, originating in the northwest on the 19th, and moving north of the Signal-Service stations toward the Lower Saint Lawrence Valley.

No. IX Pursued the same track on the 21st and 22d, and it, too, was of comparatively minor importance.

No. X Began in the northwest on the 24th, in the morning, and advanced from Dakota to Lake Superior on the morning of the 25th, and then rapidly moved south of Hudson Bay toward Labrador.

No. XI Came up from the Lower Missouri Valley on the afternoon of the 25th, and pursued its way over Illinois, Indiana, and the Lower Lakes on the 26th. It passed

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down the Saint Lawrence Valley, and thence from the vicinity of Montreal over New Brunswick, and was lost to view on the night of the 27th.

No. XII. A twelfth quite noticeable depression appeared in the southwest on the 30th, and moved thence over Tennessee on the 31st, producing considerable rain and snow in the Ohio Valley, and in its progress eastward over Virginia caused high winds on the Atlantic coasts. It disappeared April 1st in the Atlantic.

Besides these storms, several depressions have apparently advanced from the vicinity of Hudson Bay, southeastwardly, nearly to the Lower Lake region and Saint Lawrence Valley, but scarcely producing any marked effects in these sections, because their centres were moving eastward on higher parallels of latitude.

Meteorological data, gathered from various sources, show that these storms have been very severe after passing off the American coasts, and have apparently become more violent as they penetrated the middle and eastern side of the North Atlantic.

Without endeavoring to explain this last-named fact, it may be proper to notice that large masses of ice and icebergs were reported during March moving southward and eastward off the Newfoundland coast and banks.

ANTI-CYCLONIC AREAS.

The number of anti-cyclones, or areas of high barometer, around which the winds drew in a general direction with the hands of a watch, is six. Some of these anti-cyclonic areas have been very large, covering more than one-half of the country at the same time. The pressure of the atmosphere near their centres or crests has in some cases been as high as 30.58 and 30.73 inches. The general path pursued by these meteors has been from northwest to southeast. They have largely served to determine the temperature, wind and humidity conditions of the entire country. They have also exerted a marked and potent influence on the direction, intensity, &c., of all the cyclonic centres. Some of them remained stationary, or almost so, for several days in the Northwest.

PRECIPITATION.

The rain-fall and snow-fall are graphically shown on Chart No. 2. It will be observed there was a very large excess of rain for all the Gulf States, and a deficiency for New England, the Middle and South Atlantic States The deficiency is quite marked in northern New England and in Florida, where the precipitation falls below a single inch for the entire month. The most marked deficiency is in the Middle States. and is one and a half inches, and nearly the same in New England and the Lower Lake region.

There is an excess of about one and a half inches for the Ohio Valley and Tennessee. The snow-fall in the Rocky Mountains has been unusually heavy.

TEMPERATURE.

The thermometric data are given on accompanying Chart No. 3. This chart shows that the thermal conditions were decidedly equinoctial over the larger portion of the country, excepting, of course, the mountainous and extreme northerly States and Territories. The only remarkable deficiency of temperature was in the Upper Mississippi Valley. There was a slight excess in the South Atlantic States and the Ohio Valley and Tennessee. The uniformity of the isothermals and their parallelism with the lines of latitude are strikingly delineated on the chart. The only departure from this parallelism is in the Appalachian region, where the influence of altitude deflects the isothermal of 45° southward.

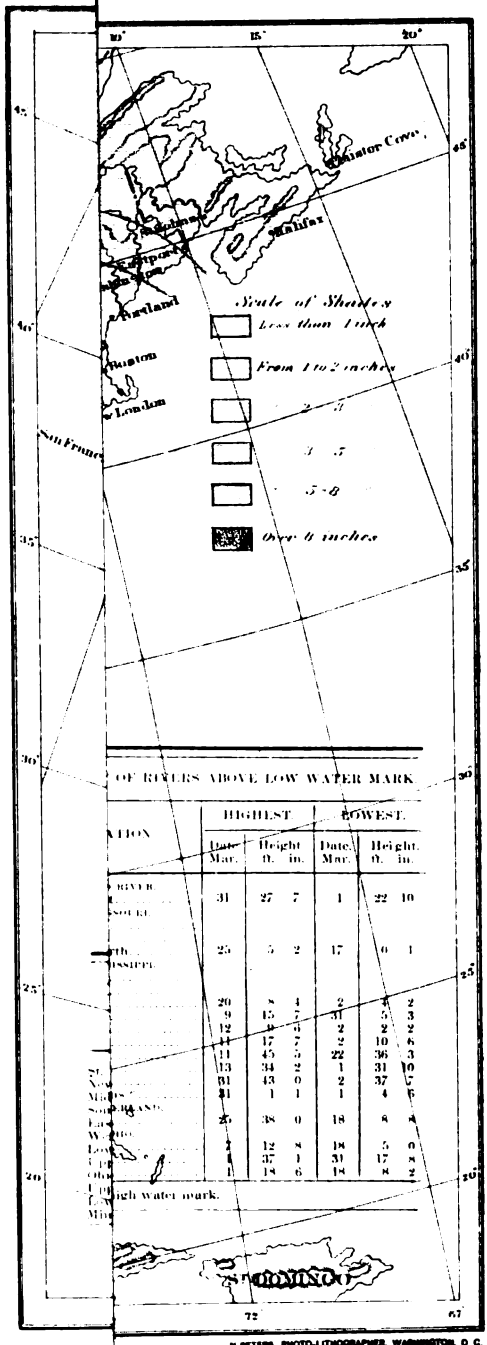
ATMOSPHERIC PRESSURE.

The only remarkable feature in this element of the weather is the uniformity, which is strikingly appropriate to the equinoctial month. There is no considerable deviation from 30.00 inches of pressure, except in the northeastern section of the country. There, the isobars come near together, and the pressure is very low, especially in Nova Scotia and the Lower Saint Lawrence Valley. The isobarometric lines are found on Chart No. 3.

WINDS.

The March winds, as a glance at Chart No. 3 will show, are characteristically from the northwest. The only observable exception to this is in the easterly and southeasterly winds of the Gulf of Mexico and the Western Gulf States, in which the trade-wind influence manifests, so early in the spring, its predominance. At Mount Washington, winds were reported on the 23d, of velocity as high as 130 miles an hour and continuing near that enormous force for twenty-four hours.

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OF RIVERS ABOVE LOW WATER MARK.

ATION	HIGHEST			LOWEST.		
	Date. Mar.	Height ft.	in.	Date. Mar.	Height ft.	in.
RIVER	31	27	7	1	22	10
SOUR						
th. SSIPPI	25	5	2	17	0	1
	20		1	2		2
	9	15	7	31	5	3
	12		5	2	2	2
	11	17	7	2	10	6
	11	45	5	22	36	3
	13	34	2	1	31	10
	31	43	0	2	37	7
	31	1	1	1	4	6
RANO						
	25	38	0	18	8	4
	1	12	8	18	5	0
	1	37	1	31	17	8
	1	14	6	18	8	2

igh water mark.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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RIVERS.

The condition of the rivers will be found in one of the tables on Chart No. 2. The Red River, it will be seen, rose at Shreveport to its highest as the month closed. So also the Missouri at Leavenworth. The Cumberland was very high on the 25th, but afterward fell considerably. The Ohio was in flood, the first of the month, at Cincinnati and Louisville, but it fell at the close. During the whole month the Mississippi River rose slowly but steadily at Vicksburg to forty-three feet above low-water mark. Also, about the 11th, it rose at Cairo forty-five feet above low-water mark, but, as the month progressed, it fell at the latter point. The month closed without any indications of very alarming floods in the western rivers.

PECULIAR PHENOMENA AND FACTS.

From Nashville the observer reports, what may be of interest to agriculturists, that an inspection of the country around Nashville by a member of the board of trade of that city shows "that the grasshoppers and other insects which are usually killed by the cold of winter are this spring alive and already moving." Repeated investigation has confirmed this statement.

At Knoxville, March 7, 7 p. m., there was an extraordinarily brilliant aurora, the first of this year, "in two bands: one triangular, base in the horizon, or near it, with opposite vertex, which was ill-defined, about 15° N.W from zenith; the other was nearer in the north and far brighter, but not so extensive." The "dark segment," the "waving flag aurora," and the "merry dancers" were plainly seen for some time. The same phenomenon was seen at other points in the west where the night was cloudless. It was also reported, same night, from Albany, N. Y., "where a continuous sheet of brilliant white light encircled the horizon, extending to an altitude of 35° in the northeast and to an altitude of 12° in the southwest, the light in the northeast strongly contrasted with a dark segment of slate-color beneath it and about fifty-two streamers of straw-color." On the same night and hour it was observed at Norfolk, Va., where the color was of a "pale yellow," partly obscured by clouds; and, from this point, it was visible far westward. The observer at Pike's Peak reports that, for the first time since the occupation of the summit, he saw an auroral arch on the same evening. It was seen simultaneously at Louisville, Ky.; at Breckenridge, Minn.; at Eastport, Me.; faintly at Indianapolis, Ind.; apparently at Augusta, Ga.; faintly at Yankton, Dak., Davenport, Iowa, and other points.

During the conflagration at Indianapolis on the 22d, the wind was observed not to take any cyclonic direction, but to blow in a straight line. At Mobile, on the 22d, the thermometer reached 82° F. At Augusta, Ga., on the 16th and 17th, there were forty consecutive hours of rain-fall, amounting to 5.10 inches. At Salt Lake City, on the 17th, light snow fell from a cloudless sky, while the stars were visible over the whole sky. At Marquette, on Lake Superior, where observations are taken to compare the movements of water in the lake, and the rise and fall of the barometer, the result shows the water and barometer acted together forty times and in a contrary manner fifty-three times.

At Omaha, Nebr., on the 6th, wild geese were seen moving south. The Santa Fé observer states, in his March report: "One year ago the trees and vines had leaved out, but were killed by the frosts that came in the latter part of the month. Thus far, this year, there have been no signs of premature buds, leaves, and blossoms; from which fact all classes predict an unusually good year for fruit and all the productions of the soil. But particularly are they looking forward to a good 'grape-crop.' In the mountains there is so much snow that water is abundant everywhere; in fact all classes of people are rejoicing."

BREAKING UP OF ICE AND OPENING OF NAVIGATION.

On the 19th of March the ice all disappeared from the river at Rochester, N. Y., and navigation to that port was resumed on the 23d. At La Crosse, Wis., the Mississippi opened on the 28th, or nine days later than last year, having been closed four months and one day. The navigation at Alpena, Mich., re-opened on the 20th; at Detroit on the 18th. At Yankton, Dak., the ice in the Missiouri broke up on the 20th; the ice in the harbor at Buffalo gave way on the same day, but not sufficiently to render navigation easy or safe.

CAUTIONARY SIGNALS.

During the month of March, including the night of the 31st, there were ordered for ports of the United States, in all, fourteen cautionary signals. Of this number

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one was late. The correctness of one is doubtful. The number reported as actually justified was twelve. This gives as the percentage of correct signaling, 85. Owing to the suspension of navigation on the lakes, no signals were displayed there during March.

Besides the display of cautionary signals at United States ports, there were telegraphed to Canadian ports twenty-nine warnings of approaching storms. Although the exact percentage of justification cannot be determined from data in this office, it is known that most of these warnings were followed by dangerous gales.

It may serve to illustrate the practical utility of the cautionary signals to quote the words of the observer regarding the warning-signal hoisted on the 31st at Norfolk, Va. He says: "The signal was fully justified, as a heavy gale prevailed outside. A very large fleet (200) of sailing-vessels put into Hampton Roads, and remained there twelve hours after the signal was lowered."

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

PAPER 48[7].

MONTHLY WEATHER REVIEW, APRIL, 1874.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTORY.

The weather of April has been distinguished by the prevalence of extraordinary rain-fall throughout the Southern and Middle States, and equally unusual snows in New England and in Colorado. The courses pursued by storms have, on the average, been much to the south of their tracks of previous years. The average barometric pressure is unusually high throughout the northern sections of the country. Vegetation is everywhere reported as from ten to twenty days behind its usual condition at the end of the month. Severe floods have been reported from all the tributaries of the Mississippi River, and the result has been that a disastrous overflow has been experienced throughout Mississippi, Louisiana, and Arkansas.

STORMS.

I. The history of this storm belongs chiefly to the month of March; it was central on the 1st of April in the South Atlantic States, and disappeared during the day in the Atlantic Ocean.

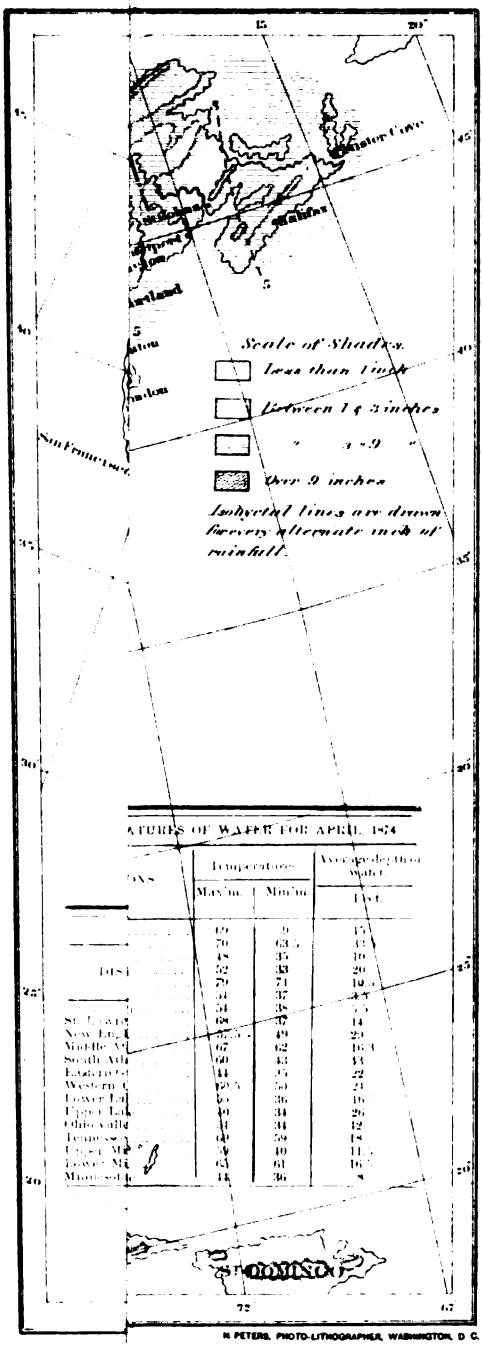
II. The track of this storm is confined to the extreme northern limits and border of the region of our stations; it passed on the 3d of the month over the mouth of the Saint Lawrence, after having produced a slight disturbance in the Lower Lake region.

III. This storm first became visible as a well-developed depression in Indian Territory on the morning of the 4th, having apparently traveled northeastward from Texas; its course was in a straight line due northeastward over Lake Erie and the Gulf of Saint Lawrence, which latter region was reached on the 6th. Very extensive rains uniformly prevailed over the Southern and Atlantic States, and snow over the Lake region and Upper Mississippi Valley. Dangerous winds prevailed over the Lower Lakes and Middle Atlantic coasts.

IV. This is first located in Texas, where it very possibly may have originated; it moved eastward into Alabama on the 9th, and thence northeastward to the Middle Atlantic coast on the 10th. Severe northerly gales followed in its rear in the southwest; northeasterly gales preceded its approach to the Atlantic coast; it then passed northeastward at a short distance off the coasts of New England and Nova Scotia, and was east of Cape Sable on the 11th. This was the most generally severe storm of the month on the Atlantic coast, but was on the New Jersey coast perhaps exceeded by that of the 25th instant.

V. The fifth important storm of the month was confined to the extreme northeastern portion of the country. While an area of very high pressure was pressing southeastward over the northwest and Upper Lake region, the storm in question moved southeast and then northeastward over the Saint Lawrence and Canadian Provinces, its effects being most severely felt in New England on the 12th.

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VI. The area of high barometer alluded to in the preceding paragraph separated the centres of storms Nos. V and VI. The latter disturbance apparently passed from the Pacific Ocean eastward into the northwestern Territories and British Possessions on the 11th, and very quickly produced a rapid fall in the barometer throughout the Northwest, the intensity of the disturbance being increased by the influence of the high barometer over the Lake region. Southwesterly gales prevailed in the Missouri Valley at midnight of the 11th, and over the Missouri and Upper Mississippi Valleys on the 12th, with fresh, southerly winds throughout the entire Southwest. The depression assumed the shape of a trough, or extremely elongated ellipse, on the morning of the 13th, but the southern extremity rapidly closing up, it became approximately circular by midnight of that date, at which time it was central in Southern Wisconsin. Brisk and high southerly winds prevailed during the 13th and 14th, successively, over Lake Michigan and the Lower Lake region, while the storm-centre pursued a northeasterly course over Canada to the Gulf of Saint Lawrence, where it was last observed on the 16th.

VII. This storm first appeared in Indian Territory on the morning of the 14th, its origin having apparently an intimate connection with the storm No. VI, which was at that time in the extreme Northwest. The track of No. VII presents an unusual appearance in that it trends nearly southeastward, and is finally lost in the Gulf of Mexico. It appears to have been broken up into several areas of low pressure, accompanied by numerous local thunder and hail storms throughout the Southern States. The severest winds are reported from the coast of Texas on the 16th and 17th.

VIII. It is not impossible but that this storm, which is first located, at midnight of the 17th, in the western portion of the Gulf of Mexico, may be in fact identical with No. VII, which latter, after having pursued its unusual course, may have returned upon the usual track of the storms visiting the western Gulf. The course pursued by No. VIII during the 18th was almost due northward into Indian Territory, and thence northeastward over the Lower Lake region, over which it passed on the 20th, to Cape Breton, where it disappeared on the 22d. Strong northeast winds and rain prevailed over the Lake region; easterly winds and heavy rain in the Atlantic States on the 18th, 19th, and 20th.

IX. The extensive snows of the 20th, in Colorado and New Mexico, are our earliest indications of the disturbance that culminated on the 22d in a well-defined storm-centre in Texas, which was by the 22d central in Tennessee, and was followed by a severe "Norther" on the western Gulf coast. The storm disappeared on the 23d, off Cape Hatteras, having been accompanied by very general rains in the Southern States.

X. While the preceding storm was passing eastward, No. X was advancing rapidly southeastward over Manitoba and Dakota, where it was central on the 24th. Considerable rain fell on that and the subsequent day over the Upper Lake region, when the storm turned northeastward and disappeared in Canada.

XI. The cold northerly winds over the Southwestern States on the 23d, undoubtedly initiated the extensive precipitation that prevailed on the morning of the 24th throughout the Northern Gulf coast, developing a well-marked barometric depression that had by midnight progressed northeastward into Alabama. By midnight of the 25th, the storm was central in the immediate neighborhood of the coast of New Jersey, and severe easterly gales were then prevailing from that point to Nova Scotia, and continued to precede the advance of the storm throughout the following day. The last position given for this storm-centre was on the morning of the 27th, when it was off the coast of Cape Breton. While the storm was passing eastward from Tennessee on the 25th, there appears to have been formed a subsidiary depression, which passed north and then eastward, uniting with the main centre on the 26th.

XII. This storm appears to have originated in the mountains of Colorado and the neighboring Territories on the 25th and 26th; it was central in Kansas and Nebraska by midnight of the latter date; its advance eastward was, at first, comparatively slow in the presence of areas of high barometer then existing in the Upper Lake region and the South Atlantic States. Heavy rains prevailed on the night of the 27–28th in the Ohio and Tennessee Valleys and snow on the Lower Lakes. The storm-centre moved nearly eastward to the Atlantic coast and then turned sharply to the northeast, passing over Maine on the 29th at midnight.

XIII. The history of this remarkable storm belongs especially to the month of May, during the first five days of which it slowly moved from the Northwest to Tennessee and thence to Cape Hatteras. The origin of this storm is to be found on the Pacific coast, as it evidently passed over Washington Territory on the 28th and 29th, and over Montana on the 30th.

BAROMETRIC PRESSURE.

The distribution of barometric pressure for the month is shown by the isobaric lines on Chart No. 2, and appears to have been unusually high over the northern sections of the country, with, however, only a very slight deficiency in the extreme southeast.

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TEMPERATURE OF THE AIR.

The distribution of temperature for the month is shown by the isothermal lines on the appropriate chart accompanying this text. These lines result from the study of observations reported by about two hundred of the volunteer observers in correspondence with this office, combined with the observations at the regular stations of the Signal-Service. The principal feature of the month is the very general low average temperature. This is made especially apparent by collating, as follows, the reports from volunteer stations whose records run back over a long series of years:

In Maine the average temperature has been the lowest recorded in 38 years.
In Vermont the average temperature has been the lowest recorded in 24 years.
In Massachusetts the average temperature has been the lowest recorded in 34 years.
In New York the average temperature has been the lowest recorded in 25 years.
In Pennsylvania the average temperature has been the lowest recorded in 20 years.
In New Jersey the average temperature has been the lowest recorded in 9 years.
In Connecticut the average temperature has been the lowest recorded in 20 years.
In Maryland the average temperature has been the lowest recorded in 10 years.
In Indiana the average temperature has been the lowest recorded in 10 years.
In Illinois the average temperature has been the lowest recorded in 23 years.
In Kansas the average temperature has been the lowest recorded in 10 years.

PRECIPITATION.

The general distribution of the rain and melted snow is shown by the isohyetal lines on the accompanying chart, in drawing which about two hundred of the volunteer observers' reports have been combined with those of the Signal-Service stations. The rain-fall in the Gulf and Atlantic States has been, in general, one of the largest on record; that at Vicksburg, where sixteen inches fell in four days, has been quite without precedent.

As with the rain-fall in the South, so with the snow-fall in the eastern section of the country, and equally so in the far West.

The snow-fall in Maine has varied from 15 to 41 inches.
The snow-fall in New Hampshire has varied from 30 to 43 inches.
The snow-fall in Vermont has varied from 33 to 56 inches.
The snow-fall in Massachusetts has varied from 11 to 2 inches.
The snow-fall in Connecticut has varied from 12 to 22 inches.
The snow-fall in New York has varied from 10 to 50 inches.
The snow-fall in Pennsylvania has varied from 4 ? to 38 inches.
The snow-fall in Ohio has varied from 2 to 16 inches.
The snow-fall in Indiana has varied from 2 to 4 inches.
The snow-fall in Illinois has varied from 5 to 11 inches.

In Colorado 20 inches, and in New Mexico 15, fell in a single storm on the 20th. The total fall in Colorado appears to have varied between 18 and 33 according to the locality of the stations, being entirely without precedent since the settlement of the State in 1857, and producing great destruction among the herds of cattle and sheep, &c.

At the close of the month several inches of snow remained on the ground throughout Northern New York and New England, and great drifts in the ravines in Colorado.

WINDS.

The prevailing winds are shown by the arrows on Map No. 2. North and east winds have been unusually frequent throughout the Northeast and Northwest.

Of special instances of severe winds probably those observed at Long Branch on the 25th and 26th were the most unusual. Hourly velocities of 64 and 72 miles were recorded on those dates.

CAUTIONARY SIGNALS.

Reports have been received from 37 stations concerning the justification of cautionary storm-signals displayed at those ports. No exact information is at hand with reference to the dispatches sent to the Canadian government. With respect to the Signal-Service stations, out of 153 signals displayed at 37 ports, 114 or 75 per cent. have been justified, 33 or 21 per cent. not justified, and 6 or 4 per cent. late, while 44 cases are reported in which signals were needed but not displayed.

RIVER FLOODS.

The most notable feature has been the disastrous floods in the Lower Mississippi. The usual spring flood had, during the latter part of March, occasioned considerabl

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damage to the levees near New Orleans, which were being repaired as usual, when the extraordinary rains of April began to make themselves felt throughout Louisiana. The most severe crevasses have been those known as Hickey's, Hushpuckana, the Grand Levee or Morganza, McCullum's, Waterproof, Bonnet Carré, Belle Chasse, and Greenwood.

The first and third remained open at the end of the month and must continue so until the waters have subsided enough to allow filling them up; that at McCullum's was closed on the 28th. Through these crevasses and general overflow of the banks of the Mississippi the whole valley of the river has been devastated to such an extent that it is estimated that the loss will be equivalent to one-sixth of the annual produce of the region in question. The highest and lowest water recorded at the Signal-Service stations are given in the accompanying table.

Height of rivers above low-water mark.

Stations.	Highest.		Lowest.	
	Date, April.	Height.	Date, April.	Height.
		Ft. in.		*Ft. in.*
MISSOURI.				
Fort Sully	18	3 6	22	1 7
Yankton	20	11 4	1	5 10
Omaha	22	7 5	15	3 4
Plattsmouth	22	1 4	18	1 11*
Saint Joseph	24	6 3	18	2 1
Leavenworth	25	3 11	18	0 4
Kansas City	25	9 3	19	5 10
Lexington	25	7 0	18	3 8
Brunswick	26	6 1	16	1 4
Boonsville	27	8 9	15	5 7
Jefferson City	22	9 9	4	3 8
Hermann	23	10 8	16	5 8
MISSISSIPPI.				
Saint Paul	27	9 0	12	6 2
La Crosse	30	7 6	5	3 3
La Claire	30	5 9	2	3 5
Dubuque	30	10 3	1	6 4
Davenport	30	7 0	18	4 5
Keokuk	1	7 8	19	5 5
Warsaw	30	6 8	19	5 8
Saint Louis	24	18 11	18	13 1
Cairo	27	47 4	7	33 4
Memphis	30	34 10	6	43 0
Helena	30	43 2	14	40 9
Vicksburg	30	45 8	6	43 0
New Orleans	15	0 7†	30	1 8‡
RED RIVER.				
Shreveport	30	30 3	15	25 5
CUMBERLAND.				
Nashville	16	49 2	1	12 2
OHIO.				
Pittsburgh	29	17 1	1	5 11
Marietta	30	25 7	3	7 5
Cincinnati	30	45 0	8	18 8
Louisville	30	19 2	2	8 6
Evansville	16	37 2	10	12 8
Paducah	26	46 10	7	27 3
ALLEGHENY.				
Freeport	21	8 2	3	1 8*
YOUGHIOGHENY.				
Confluence	29	7 10	2	1 10
MONONGAHELA.				
Morgantown	26	16 2	1	2 11
New Geneva	26	17 8	1	0 3
Brownsville	11	23 0	7	2 0

* Below bench-mark. † Above high-water mark. ‡ Below high-water mark.

ICE IN RIVERS, LAKES, ETC.

The ice is reported to have cleared away on the following dates, so as not to impede navigation at the places named:

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On the 3d, at Gardiner, Me., the Kennebec River having been closed one hundred and thirty-four days at Augusta; on the 10th, at Saint Paul, Minn.; on the 14th, at Breckenridge, Minn.; on the 16th, at Bangor, Me; on the 18th, at Buffalo, N. Y.; on the 23d, at Pembina; on the 30th, at Escanaba; and on the 29th, at Rochester, the Erie Canal was opened.

TEMPERATURE OF WATER.

The maximum and minimum temperature of the water, in the rivers and harbors, is given in the small table on the Map No. III.

FROSTS.

The prevailing cloud and rain of the month have retarded the advance of vegetation to such an extent that the frosts that have been experienced, although severe on early vegetables, appear to have done less damage to fruits than might have been otherwise experienced. Frosts were reported from Texas, Alabama, and Virginia, on the 10th, and in Illinois and Nebraska on the 21st; the frosts most extensively felt, however, were those of the mornings of the 29th and 30th. On the former date it was experienced in Missouri, Illinois, Michigan, Ohio, Tennessee, Virginia, New Jersey, and possibly to a slight extent in Florida; on the 30th frost prevailed very generally over Alabama, Tennessee, and West Virginia, and the entire Atlantic States, from Northern Florida to New York.

BOTANICAL AND ZOOLOGICAL PHENOMENA.

1. *Vegetation.*—From observations too numerous to detail, it appears that on the last day of the month vegetation was very generally backward to the extent of fifteen or twenty days, in comparison with the average of former years, but had been developing very rapidly during the last two days in the south, and especially in the west. The frosts of the month appear in general to have injured only such a proportion of fruit, buds, or blossoms, as was beneficial rather than injurious to the remainder of the crop.

2. *Fisheries.*—Shad are reported to have first appeared in the Potomac on the 5th and in the Hudson on the 13th.

3. *The migration of Geese and Ducks.*—The migration northward of wild geese, which is looked upon by many as the sure harbinger of spring, was noted on the following dates:

On the 3d at Kingston, Mass.; 4th at Mount Desert, Me.; 10th, 11th, and 12th at Saint Paul; 15th near New York City; 19th at Saint Paul, Minn.; 22d at New Haven, and 29th at Welborn, Fla.

LOCAL STORMS.

Local storms, generally of the nature of tornadoes and hail-storms, have been reported on the 6th at Memphis and New Madrid; 14th at Cleveland; 15th at Shreveport; 20th at Erie, Pa.; 14th at Fort Gibson, Ind. T.; 7th at Norfolk, Va.; midnight of 14-15th at Nashville, Tenn.; 7th at Wilmington, N. C.; a terrible squall, of the violence of a hurricane, was reported from Halifax on the 10th.

PRAIRIE-FIRES.

Numerous prairie-fires were reported as seen on the 16th at Breckenridge; 19th at Saint Paul.

METEORS.

Remarkably bright meteors were noted on the 3d at Trenton, N. J.; 13th at Fort Gibson, Ind. T., and Morgantown, W. Va.; 16th at Troy, N. Y.; 18th at Wooster, Ohio; 21st at Augusta, Ga.

SOLAR AND LUNAR HALOS.

These have been remarkably frequent during the month. The only day on which a lunar halo has not been reported at some one of the three hundred stations was the 5th. The lunar halos most extensively observed were those of the 1st, observed from Nebraska to New York; the 4th, from Virginia to Michigan; the 10th, from New Jersey to Massachusetts; the 22d, from Georgia to New Jersey; the 23d, in North and South Carolina; the 24th, over Pennsylvania, New York, and New England; the 26th, in Kansas, Minnesota, Mississippi, and New York; the 27th, in Michigan, New York, and

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Pennsylvania; the 28th, from Iowa to Maine; the 29th, from Minnesota to Georgia and to Maine.

Solar halos have been observed on about half the days of the month; of these, those especially notable were observed—on the 4th, in Illinois, Iowa, and Pennsylvania; on the 5th, in New York and New England; the 13th, from North Carolina to New York and Ohio; the 14th, in Maine, the Middle States, and Iowa; the 22d, in New Jersey, Delaware, Ohio, and Indian Territory; the 24th, in Delaware, Pennsylvania, Ohio, and Indian Territory; the 28th, in Maine, New York, Ohio, and Iowa.

ATMOSPHERIC ELECTRICITY.

1. *Thunder-storms.*—The records of April seem hardly full enough to warrant an attempt at a graphical representation of the distribution of thunder-storms. The following list gives, in general, the date of the occurrence of the first thunder-storm of the season and occasionally the date of an extremely severe storm: On the 4th, in Kansas; 5th in Indian Territory; 6th, in Tennessee and Missouri; 7th, in North Carolina, Virginia and New Jersey; 9th, in Virginia; 10th, in New Jersey; 14th, in Tennessee, Ohio, and Indian Territory; 15th, in Tennessee and Louisiana; 17th, in Florida; 20th, in Virginia, Ohio, Pennsylvania, and New York; 21st, in Virginia and Louisiana; 27th, in Texas; 28th, in Maryland.

2. *Telegraphic ground currents.*—The one station reporting the occurrence of the phenomena is Pembina, where it was observed during the 29th.

3. *Auroras.*—The most remarkable aurora that has been recorded during this month was that observed on the night of the 7th and morning of the 8th. Details of its observation have thus far been received from over fifty stations, covering the country from Iowa and Dakota on the west to New Jersey and Maine on the east; this aurora was also well observed at Fort Gibson, Ind. T. Auroras were also observed at numerous stations on the 1st, 3d, 4th, 5th, 6th, 7th, 8th, 9th, 12th, 13th, 14th, 16th, 28th 29th.

EARTHQUAKES.

No notices of earthquakes have been reported by the signal-service or volunteer observers, except the reports of Professor Duprey and others relating to the disturbances at Bald Mountain, in North Carolina, which show that the phenomena in that region have continued and are of the nature of slight concussions, with no traces of volcanic action.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

PAPER 48[8].

MONTHLY WEATHER REVIEW, MAY, 1874.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

I.—INTRODUCTORY.

This month has not been distinguished by any general storm of unusual severity, but numerous local thunder and hail storms have been reported. The presence in the southeastern quarter of the United States of several large areas of high barometer has apparently produced a considerable rain-fall on the immediate Atlantic coast, with a decided deficiency in the interior of the country.

II.—BAROMETRIC PRESSURE.

1. *In general.*—The average distribution of atmospheric pressure for the month of May is shown on the accompanying chart, from which it appears that the region of highest barometer includes the South Atlantic and Gulf States, while the areas of lowest pressure are respectively in the Missouri Valley and the Saint Lawrence Valley; the barometric pressure in Oregon is notably higher than in New England, a feature which accords with the general law that pressures average higher on the eastern than on the western borders of oceans.

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2. *Areas of high barometer.*—Nine well-marked areas of high barometer have been traced during the month, five of which appear to have passed, without losing their identity, from the Pacific coast southeastward to the Atlantic.

3. *Areas of low barometer.*—Eight areas of low barometer, forming the centres of considerable atmospheric disturbances, have passed over the region covered by our stations, and their central tracks are shown on chart No. I. In general the paths of these storm-tracts lie considerably further north than do those of May, 1873; their courses being almost due eastward, while those of last year were more frequently northeastward.

No. I. The course of this depression is traced, in the review for April, backwards to the Pacific coast. It was, on the 1st of May, central in Nebraska, and quite steep barometric gradients extended from that region to the Upper Lakes and to the Gulf States. The storm-centre, which had been moving with extreme slowness during several preceding days, apparently moved southward to the western plains until, on the morning of the 3d, it was central in Eastern Kansas. A very extensive area of cold air and high barometer had meanwhile pressed southeastward over the Lake region to the Middle Atlantic coast, the presence of which evidently materially modified the subsequent movements of the storm-centre. The latter moved in consequence almost due eastward, passing over Tennessee and Kentucky on the 4th, on which date the barometer at the centre was fully three-tenths of an inch higher than it had been on the previous day; but on passing over the Blue Ridge the central depression again increased until it had passed over Cape Hatteras beyond our cognizance.

No. II. This depression is first indicated by reports from the extreme Northwest on the 6th, and on the 7th, while it was still in the Upper Missouri Valley, a very extensive area of high barometer developed over the Gulf and South Atlantic States. On the morning of the 8th a quite steep barometric gradient prevailed over the entire country from Texas and Michigan to Manitoba, and south or southwest gales prevailed from Colorado and Wyoming to Wisconsin and Illinois. The barometer continued to rise during the day throughout almost the entire Atlantic and Gulf coast States, while it fell rapidly over the entire country north of the Ohio and Missouri Rivers. This unusual state of things continued during the 9th and 10th, and on the morning of the 11th the barometric depression was still central in Minnesota and Dakota; during the subsequent day, however, it slowly moved eastward into Canada and was lost to further observation, having apparently been separated into at least two portions, one of which is No. III of the accompanying chart.

No. IV. This disturbance was first indicated by falling barometer and rain reported from Santa Fé on the 12th. The exact position of the area of greatest disturbance can scarcely be given until the morning of the 14th, at which time it was central in Kansas, whence it moved slowly eastward over Illinois on the 15th, Lake Erie on the 16th, and the Saint Lawrence Valley on the 17th. During the middle portion of its course the barometric gradients were very slight, but increased decidedly when the disturbance was in the Ohio Valley.

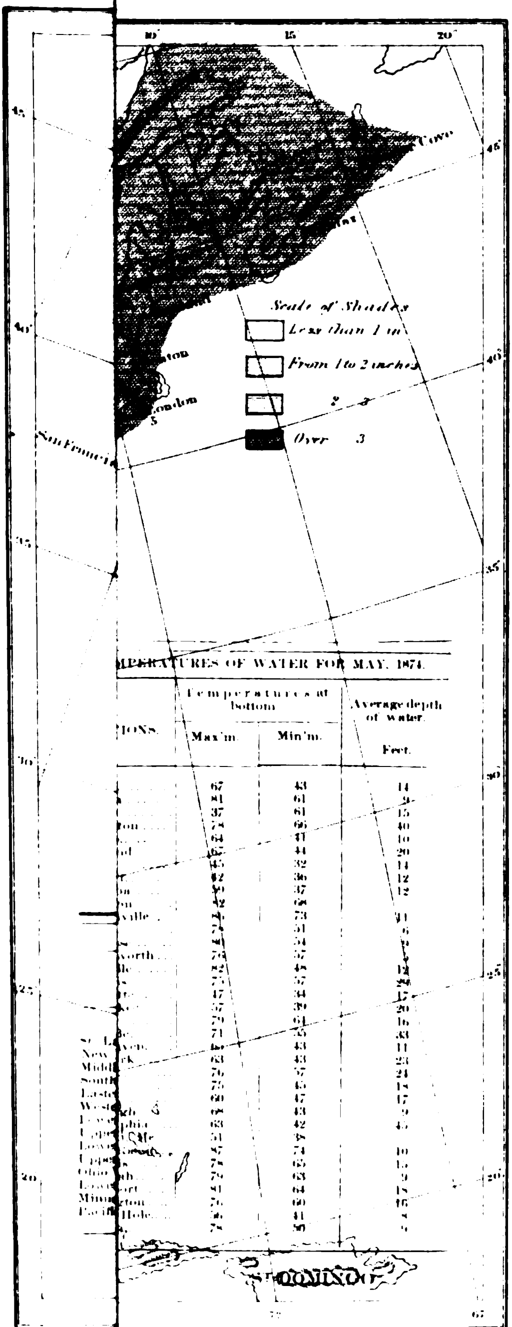
No. V. The area of high barometer, that on the 17th covered the Southern States, gave rise to warm southerly winds, that encountering an area of cold air that pressed southeastward over the Upper Lake region, initiated a precipitation that gave rise to the depression numbered V, which may be considered in some sort as a remnant of No. IV. This area of low barometer passed slowly eastward over New England, and turning northeastward over Maine on the 19th disappeared in the Gulf of Saint Lawrence; it was accompanied by numerous light rains in the Middle and Eastern States.

No. VI. This depression probably passed over the Rocky Mountains on the 17th, and followed immediately in the train of an area of high pressure. Rain was reported from Minnesota on the afternoon of the 18th, and the lowest pressure was central in the southern portion of that State on the morning of the 19th. Its course continued slowly southeastward over Lake Erie on the morning of the 20th, and thence over New York on the 21st and Maine on the 22d.

No. VII. An extensive area of high barometer separated the preceding storm-centre while it was in Maine from No. VII, which, on the morning of the 22d, was in Dakota and Manitoba. In twenty-four hours this depression moved somewhat to the northeast, and on the 24th it develo ped rapidly as it moved over the Upper Lakes. On the morning of the 25th the depre ssion was central over Lake Huron, and rain prevailed throughout the Middle and Eastern States. During the day this disturbance moved eastward and northeastward, and was accompanied on its south and east sides by unusually numerous local thunder and hail storms, of which a special report is in preparation.

No. VIII. This disturbance probably originated on the plains west of the Mississippi, up which an easterly wind had, for several days, been blowing, in consequence of the high pressure then existing in the South Atlantic States. The greatest depression was on the morning of the 27th, in Dakota, on the afternoon of which date there were presented in that region, in a marked degree, a great contrast of cold north and hot south winds, the temperature ranging from 90 to 95 degrees from Lake Superior to Nebraska, with numerous local thunder-storms, while 57 degrees was reported from

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Pembina and Fort Garry. This conflict of north and south winds, with low barometer, continued for forty-eight hours, when an area of high barometer advanced southeastward toward Lake Superior, and on the 29th and 30th the original disturbance died away, and disappeared in Canada.

4. *Local storms.*—By the term local storm, will be included, in this section, every recorded case of thunder, lightning, or hail. The electrical phenomena attending these storms will be considered in a subsequent paragraph; but so far as these storms are connected with the areas of low barometer, their distribution will be apparent from the following table of local storm frequency:

Regions reporting 1, 2, or 3 local storms during the month, at the signal-service stations:

Ohio Valley.
Middle Atlantic coast.
New England.
New York
Upper Lake region.
Upper Mississippi Valley.

Regions reporting from 4 to 8 local storms during the month, at the signal-service stations:

South Atlantic States.
Blue Ridge.
Tennessee.
Gulf States.
Missouri Valley.
Colorado.
New Mexico.

The most remarkable series of thunder and hail storms is reported from Pike's Peak, where they have occurred on 12 different days, mostly during the last half of the month.

III.—ATMOSPHERIC TEMPERATURE.

1. *In general.*—The general distribution of the temperature is apparent from the accompanying chart of isothermal lines and the table of comparative temperatures. For the entire Atlantic States a slight deficiency is reported, but in the interior of the country a decided excess.

2. *Frosts.*—No remarkably severe frosts have been reported during the month, but slight frosts have been quite frequent in the Northwest, the Ohio Valley, the Lower Lake region, and New England. The most extensive frosts occurred on the 7th in North Carolina, Virginia, Pennsylvania, New York, and Ohio; on the 18th in Illinois, Iowa, Michigan, Wisconsin, Indiana, and Ohio; on the 19th in Ohio, Indiana, Virginia, North Carolina, New York, and Maine; on the 23d in Pennsylvania, Virginia, and New Jersey.

IV.—PRECIPITATION.

1. *In general.*—By the isohytal lines on the accompanying chart, it will be seen that the rain-fall during May has been distributed in a manner remarkably complementary to that of the preceding one, a great deficiency being reported from the Mississippi Valley and the entire northern and western sections, while a slight excess has prevailed in the South and East Atlantic States.

2. *Special droughts.*—The long succession of 26 rainless days in some portions of the South Atlantic States has given rise to some complaints from limited regions in North Carolina, notwithstanding the large quantity of rain that has fallen on the coast. In the Tennessee and Ohio Valleys, Iowa, Indiana, Illinois, and Minnesota, the month has been remarkably dry.

3. *Cloudy days.*—The number of days entirely cloudy, as reported from the signal-stations, averages as follows:

5 on the Gulf coast.
7 on the South Atlantic coast.
8 on the Middle Atlantic coast.
12 on the East Atlantic coast.
5 in the Lower Mississippi Valley.
5 in the Ohio Valley.
5 in the Upper Mississippi Valley.
8 in the Lower Missouri Valley.
7 in the Lake region.

4. *Rainy days.*—The number of days in which rain fell, as reported from the signal-service stations only, is as follows:

3 on the Gulf coast.
10 on the South Atlantic coast.
8 on the Middle Atlantic coast.
8 in the Upper Mississippi Valley.
10 in the Lake region.
6 on the East Atlantic coast.
3 in the Lower Mississippi Valley.
7 in the Ohio Valley.
9 in the Lower Missouri Valley.
8 over the Blue Ridge and Alleghanies.

5. *Special rains.*—Remarkably heavy rain-falls occurred—

On the 27th at Galveston.
On the 11th at Clarksville, Tex.
On the 25th at Brookhaven, Miss.
On the 25th at Sugar Island, Mich.
On the 20th at Brownsville, Penn.

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Severe hail-storms appear to have been unusually frequent. The most instructive report on the subject comes from the summit of Pike's Peak, where, on the 14th, large balls of hail fell, composed of soft, white snow, without any nucleus. Remarkably large hail is reported from Pennsylvania on the 20th, and from Mississippi on the 25th.

V.—HUMIDITY.

In the following table a synoptical view is given of the average per cent. of relative humidity for the several sections of the country:

For the Texas coast, 72; for the New Jersey coast, 74; for the South Atlantic coast, 68; for the interior of the Middle Atlantic States, 62; for the New England coast, 65; for the southern shores of the Lower Lake region, 62; for the Upper Lake region, 65; for the Lower Mississippi Valley, 60; for the Ohio and Tennessee Valleys, 56; for the Upper Mississippi Valley, 56; for the Lower Missouri Valley, 56; for the extreme Northwest, 62; for Cheyenne and Denver, 42; for Salt Lake City and Colorado Springs, 40; for Santa Fé, 23; for summit of Pike's Peak,* 69; for summit of Mount Washington,* 86.

Reports from the interior of Virginia, from Wisconsin, Iowa, and Indiana, state that in its relation to agriculture the month has been very dry and hot, but that cool nights and heavy dews have prevailed.

VI.—THE WINDS.

1. *In general.*—The winds most frequently observed are shown by the arrows on the accompanying chart, from which it is evident that southeasterly winds predominated on the Gulf and South Atlantic coasts, but southerly winds in the valley of the Mississippi River and its tributaries. Westerly winds have predominated in New England and west to northwest winds over the Lake region. Northwest winds have prevailed at the summits of Mount Washington and Pike's Peak.

2. *Strong winds.*—The maxima of hourly velocity of winds recorded at each signal station, without regard to the direction or the time of day, are as follows: Mount Washington, 88 miles; Pike's Peak, 60 miles; Saint Paul, 50 miles; Keokuk, Omaha, Denver, Indianola, and New York, 48 miles; Breckenridge, Duluth, Fort Sully, Santa Fé, Philadelphia, Toledo, Squan Beach, and Long Branch, 45 miles.

In general the maximum hourly velocity has been least throughout the Atlantic and Gulf States, and greatest in the Northwest, where numerous violent local wind-storms have occurred.

The dates on which strong winds were most generally observed were—May 1st, in the Western Territories and Northwest; May 8th, in the Western Territories and Northwest; May 29, in the Western Territories and Northwest; May 25, in the Lake region, Middle and Eastern States; May 11, on the Middle Atlantic coast.

VII.—VERIFICATION OF PREDICTIONS.

1. *Probabilities.*—The critical comparison between the separate items of the published tri-daily probabilities and the subsequent weather-reports shows that on the average during the month, 84½ per cent. of the predictions have been well verified.

VIII.—RIVERS AND NAVIGATION.

1. *Opening of harbors, &c.*—The last traces of ice in harbors and lakes are reported at Traverse City, Michigan, on the 3d; at Mount Desert, Maine, on the 6th; at Buffalo and Duluth, on the 9th. The Erie Canal was opened on the 5th. An unusually high tide is reported at Indianola, Texas, on the 29th. Navigation is reported as beginning at Duluth on the 4th, and at Traverse City on the 7th.

2. *Heights of rivers.*—The general condition of the rivers will be found from the accompanying table, which gives the dates of the maximum and minimum heights of water:

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* These figures have not been corrected for the altitude of these stations, which respectively are 14,216 and 6,285.

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Height of rivers above low-water mark.

Stations.	Highest.		Lowest.	
	Date, May.	Height.	Date, May.	Height.
MISSOURI.		*Ft. in.*		*Ft. in.*
Yankton	19	12 4	13	8 11
Omaha	22	7 1	13	4 4
Plattsmouth	23	2 0	13	1 2†
Saint Joseph	24	6 4	8-9 15-17	3 3
Leavenworth	25	3 9	9	1 4
Kansas City	25	9 1	8-15	6 7
Lexington	26	6 4	22	3 4
Brunswick	27	4 9	21-22	1 9
Boonville	5	8 6	23	4 9
Jefferson City	5	8 6	23	5 0
Hermann	5	7 10	23	4 10
MISSISSIPPI.				
Saint Paul	1	8 9	22	6 0
La Crosse	10	8 5	31	5 3
Le Claire	15-16	6 6	28	5 2
Dubuque	13-17	11 5	31	8 7
Davenport	16-17	8 2	31	6 0
Keokuk	19	8 3	31	6 6
Warsaw	17-20	8 11	31	7 1
Saint Louis	7	17 5	28	13 5
Cairo	1	45 8	30-31	14 8
Memphis	1-4	34 10	31	14 0
Helena	11	45 10	30	26 8
Vicksburg	1-5	45 8	31	43 1
New Orleans	2	1 6*	26-31	2 7*
RED RIVER.				
Shreveport	1	30 3	21-22	23 2
CUMBERLAND.				
Nashville	1	34 2	31	3 6
OHIO.				
Pittsburgh	1	13 2	31	4 0
Marietta	1	25 7	28	4 10
Cincinnati	1	46 0	31	9 1
Louisville	3	22 9	31	4 8
Evansville	5	38 7	31	5 7
Paducah	1	44 10	30	8 6
ALLEGHENY.				
Freeport	1	5 5	25	1 5†
YOUGHIOGHENY.				
Confluence	1	5 5	31	0 1†
MONONGAHELA.				
Morgantown	1	7 2	29-31	0 10
New Geneva	1	8 4	29	2 5†
Brownsville	1	10 6	28-29	1 2†

* Below high-water mark. † Below bench-mark.

3 *Special river-floods.*—The river-flood of most importance during this month has been that which devastated the valleys of the Lower Mississippi, Arkansas, White, Red, and other rivers. The crevasses on the Mississippi may be classified as follows: Between Memphis and the Louisiana State-line were four large crevasses and several smaller ones, opening into the States of Mississippi, Arkansas, and Tennessee. South of the Louisiana State-line, and almost exclusively opening into that State, were fourteen large and nine small crevasses. The total length of breaks in levees exceeds twelve miles. The total extent of bottom-lands overflowed exceeds 25,000 square miles. The overflowed land in Louisiana was confined to a region 20 to 50 miles broad, immediately adjoining the western bank of the river, and spreading out over at least one-half of the delta, properly so called; the entire length of the inundated region, in a north and south direction, being nearly 400 miles.

IX.—WATER TEMPERATURES.

The extremes of the temperature of the water, as observed at the signal-service stations, are given in the table on the accompanying Chart No. III.

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X.—ELECTRICAL PHENOMENA.

1. *Lightning.*—The general distribution of atmospheric electricity, so far as it accompanies local thunder-storms, has been given in a previous section. The relation of the phenomena of lightning and thunder-storms in general to the general areas of low pressure may be seen from the following statement:

The area of low pressure, No. VII, central on the morning of the 25th, near Lake Huron, had moved by the morning of the 26th to a position near Quebec, the central barometric pressure having diminished decidedly during the 25th. Local thunder-storms are reported on the afternoon of the 25th from nearly every station in the Gulf States, Tennessee, Virginia, the Middle Atlantic coast, Southern New England, and Lake Ontario.

On the 24th, area No. VII passed over the Upper Lake region. On the afternoon of that day thunder-storms were reported from nearly every station in New Mexico, Colorado, Northern Texas, the Upper Mississippi Valley, the Upper Lake region, and Lake Erie.

On the 20th, area No. VI passed over the Lower Lake region, and on the same day thunder-storms were reported from numerous stations between the Blue Ridge and Middle Atlantic coast.

On the 21st, low barometer, No. VI, passed over New England, and numerous storms were reported from the Eastern Gulf and South Atlantic States, and southern portions of New England and the Middle States.

Of special electrical phenomena, the record of the station on the summit of Pike's Peak affords remarkable instances. Those noted at that place on the 24th are among the most instructive and interesting on record. The summit of the mountain was evidently highly charged, and discharges were continually given off from every prominent point into the atmosphere and to the adjacent clouds, the only position of safety being within the stone hut occupied by the observers.

2. *Auroras.*—An unusually large number of auroras has been reported during the month, but those that have been seen were extremely faint and insignificant. They were observed on the following dates: 1st, 3d, 4th, 5th, 11th, 12th, 13th, 14th, 15th, 17th, 18th, 20th, 21st, 24th, 26th, 27th.

3. *Ground-currents.*—The phenomenon of ground-currents on telegraphic wires, common as it is on the lines running up Mount Washington and Pike's Peak, was especially noticed at the latter station on the 20th and 24th.

XI.—OPTICAL PHENOMENA.

Solar and lunar halos have been very frequently reported, but appear not to have possessed such interesting characteristics as those of April.

The lunar halo of the 22d was very generally visible throughout the Northwest, the Lake region, and the Ohio and Tennessee Valleys. A solar halo was recorded on the 23d at numerous stations in the Middle Atlantic States and in New York, and a lunar halo on the evening of the same day in the Middle and Eastern States.

XII.—MISCELLANEOUS.

1. *Botanical phenomena.*—Among the earlier phenomena of spring vegetation we note the budding of forest-trees at Colorado Springs on the 16th, the blooming of cherry-trees at Rochester on the 12th. For Lunenburgh, Massachusetts, a table has been furnished by the volunteer observer, giving the date of blooming of apple-trees for 77 years past; the earliest recorded date is the 9th of May; the mean date is the 21st of May; the latest the 3d of June. The date for the current year is the 29th of May.

2. *Zoological phenomena.*—The early appearance of insects injurious to vegetation is very generally noted, among which may be mentioned, in West Virginia and Kentucky, the so-called Colorado potato-bug. In Western New York, myriads of small flies.

3. *Prairie and forest fires.*—These have been reported from the vicinity of Alpena, Breckenridge, Buffalo, Denver, Duluth, Keokuk, Pike's Peak, Rochester, and Vicksburg.

4. *Meteors.*—Unusually bright meteors have been reported on the following dates: The 8th, 10th, 14th, 16th, 17th, 18th, 19th, 20th, 21st, and 25th.

5. *Polar bands.*—This peculiar arrangement of cirrus clouds was noticed on the 1st at Omaha; on the 2d, at Key West, Toledo, and Sandy Hook; on the 3d, at Atlantic City; on the 7th and 20th, at Key West; on the 22d, at Keokuk; on the 27th, at Atlantic City, and on the 29th, at Savannah.

6. *Earthquakes.*—The only earthquake phenomena that has been reported consist in occasional and spasmodic repetitions of the shocks that were so frequently observed in the western portion of North Carolina in March.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Brt. Assig'd,) Chief Signal-Officer, U. S. A.

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PAPER 48[9].

MONTHLY WEATHER REVIEW, JUNE, 1874.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND GRICULTURE.

I.—INTRODUCTORY.

The month of June has been distinguished by a decided excess of temperature, which has been especially marked in the central and western portions of the country, and by a decided excess of rain in the extreme northwest and northeast. The crop reports indicate on the average favorable returns, although the local exceptions to this general statement are quite remarkable, and the destruction by insects has, in some sections, particularly Southern Minnesota, been quite complete. No severe general storms have been experienced within the United States, but their occurrence has been replaced as usual during June by numerous and severe thunder and lightning and hail storms.

II.—BAROMETRIC PRESSURE.

1. *In general.*—The general distribution of barometric pressure during the month will be apparent from the accompanying map, No. 2, from which will be seen that on the average the pressure has been highest on the Gulf and South Atlantic coasts, diminishing gradually as we proceed northward to the Saint Lawrence Valley and northwestward to Dakota. On the Pacific coast the barometer has as usual stood higher than on the Atlantic coast in similar latitudes; it has averaged 0.17 inch higher at Portland, Oreg., than at San Diego. The barometric range during the month has been greatest in the northern portion of the Upper Lake region and somewhat less in Minnesota, Dakota, and New England; it has been least in Southern Florida and Texas, and on the California coast; the range in Colorado and Wyoming Territories has been about the same as in the Lower Mississippi Valley.

2. *Areas of high barometer.*—The principal areas of high barometer have been:

No. I. That which on the 3d and 4th of the month existed off the coast of the Middle and Eastern States, producing south and east winds, with cloudy weather and rain.

No. II. Present in the Gulf States on the 9th.

No. III. Advanced from Upper Canada on the 10th southeastward over New England on the 11th.

No. IV. Passed over the Rocky Mountains on the 10th, having been central in Oregon on the 9th. Its influence was felt southward as far as Texas, while the central area passed eastward over the Lower Missouri and Ohio Valleys, reaching the Middle Atlantic coast on the 14th, and continuing to produce easterly winds, with increasing cloudiness, on that coast on the 15th.

No. V. Was present over the South Atlantic and Eastern Gulf States from the 23d to the 26th.

3. *Areas of low barometer.*—The tracks pursued by the areas of low barometer are shown upon the accompanying map, No. 1, from which it will be seen that these have been confined to the northern portion of the country, the average latitude of the whole being somewhat more northerly than the similar average for June, 1873.

No. I. This depression passed from Nebraska on the 2d of the month into Iowa on the 3d, after which it ceased to be traceable as a definite disturbance, although rainy and cloudy weather were very generally reported over New England.

No. II. Passed from Dakota on the 3d into Canada, and was last recorded north of Lake Superior on the 4th.

No. III. Passed from Nebraska on the 6th eastward over the Lake region and New England, being central in the latter region on the 8th.

No. IV. Passed from Nebraska on the 7th, northeast and eastward over the Lake region and New England, being central in the latter region on the 9th.

No. V. Passed from Nebraska on the 10th, northeastward over the Upper Lake region, Canada, and the Saint Lawrence Valley, reaching the Gulf of Saint Lawrence on the 13th.

No. VI. Passed from Kansas on the 14th, northeastward over the Upper Lake region, and thence slowly east and southeastward over Canada and New England, reaching a point south of Halifax on the 18th. The barometric gradients observed in the latter part of the course of this storm-centre were, with one exception, the steepest recorded during the month, although barely amounting to a tenth of an inch for a hundred miles.

No. VII. This storm passed somewhat suddenly from an unknown point one hundred and fifty miles north of Quebec, southeastward over Nova Scotia on the 23d.

No. VIII. Passed from Wyoming Territory on the 23d, eastward over the Upper Lakes, and was lost in Canada on the 25th.

No. IX. Passed from Nebraska on the 27th, northeastward over Lake Superior and thence to the Saint Lawrence Valley, reaching the Gulf of Saint Lawrence on the 30th. This was a very well marked storm-centre. Its barometric gradients on the western

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side were, on he 28th, three-tenths of an inch to a hundred miles, with corresponding high north and west winds. During its passage eastward over Canada on the 29th, the Middle and Eastern States were visited by numerous local storms, of which some were unusually severe.

4. *Local storms.*—The number of local storms has been apparently greater than usual in the northeastern and northwestern portions of the country, and has been fully up to the average in other sections. Approximately it is estimated that at least five hundred and fifty such storms have been recorded, most of which have been seen at more than two stations. Of those that were especially remarkable, whether in relation to wind, hail, rain, or lightning, those may be noted that occurred on the following dates: On the 4th, in Colorado, Missouri, Illinois; 5th, Ohio, Michigan; 6th, Illinois, New York, Massachusetts; 7th, Nebraska, Wisconsin, Illinois, Canada, New York, Michigan, and Massachusetts; 8th, Nebraska, Iowa, Illinois, Wisconsin, Maryland, Rhode Island, Massachusetts, Canada, Cape Breton; 9th, Nebraska, Indian Territory, Pennsylvania, New York, New Jersey, Long Island, Massachusetts; 10th, Indiana, South Carolina, Virginia; 11th, Indiana and Kingston, West Indies; 13th, Louisiana; 14th, Missouri, Nebraska; 15th, Minnesota; 17th, Massachusetts; 20th, Tennessee; 21st, Havana, West Indies; 23d, Texas; 24th, Texas, Wisconsin, Virginia; 25th, Texas, Indiana, Michigan, Ohio, Canada, Pennsylvania, Virginia; 26th, Minnesota, Wisconsin; 28th, Missouri, Indiana, Ohio; 29th, Indiana, Ohio, Pennsylvania, New York, New Hampshire.

In this series of storms the most remarkable dates are those of the 7th, 8th, 9th, 25th, and 29th, on all of which days the local storms were especially prevalent over regions covered by masses of air flowing north and northeastward toward the general barometric depressions then existing in the northern sections of the country. The observer on the summit of Pike's Peak states that the local storms there experienced come from the northwest, west, or southwest, and evidently originate over the central portions of the "parks" on the hot afternoons. One such storm approached his station under conditions very favorable for observation, and he noted that while the cloud-bearing currents of air flowed toward the rotating centre from all directions they had also a decided downward movement, but through the interior funnel masses of smoke-like vapor rapidly ascended. The local storms observed at Pike's Peak belong possibly to the same class with those observed in the Gulf States and the West Indies, and which apparently originate often in the overheating of limited portions of land, rather than in the influence of the wind attending areas of low pressure. The average number of this class of storms, as observed at any one station, has been: In the Western Gulf States, 6; in the Central and Eastern Gulf, Florida and Key West, 15.

III.—ATMOSPHERIC TEMPERATURE.

1. *In general.*—The general distribution of temperature during the month is shown by the isotherms on the accompanying map No. II, on which map, as also on map No. III, the Canadian observations have been carefully combined with those of the United States. From the table of comparative temperatures, it will appear that the month throughout the whole country has been warmer than usual. The range of temperature has been least on the Texas coast and in Southern Florida, where it has amounted to about 20 degrees. It has averaged about 30 degrees from Cape May to Wood's Hole. The greatest range has been reported from Colorado and Minnesota, where it has amounted to 50 and 60 degrees. The average temperature on the summit of Mount Washington has been 42.9, or 25° below that of stations near the sea-level.

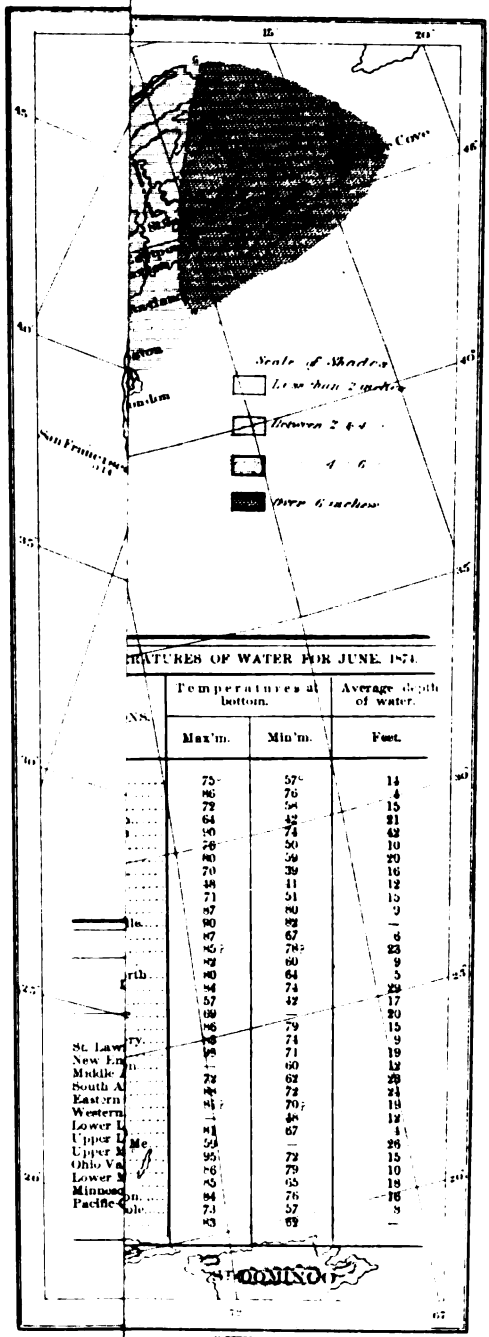
The remarkable contrasts of temperature that are noticed in the winter months on the border of regions over which northerly and southerly winds respectively prevail, are represented during this month by only a single instance—that of the afternoon of the 26th of June—on which occasion a slight barometric depression appears to have been central in Northeastern Pennsylvania. South and west winds were at the time prevailing, with a temperature of 90 or more over the South Atlantic and Eastern Gulf States, as also over a portion of West Virginia and Maryland. Southeasterly winds, with a temperature of 68 to 76, prevailed in the southern part of New England, and northerly winds, with a temperature of 56 to 60, prevailed in Central New York.

2. *Frosts.*—Slight frosts have been very generally reported on the following dates: 1st, Michigan; 2d, New York, Ohio, Pennsylvania, and Vermont; 10th, Iowa; 11th, Iowa; 12th, Michigan and Nebraska; 13th, Ohio; 14th, Pennsylvania and Vermont; 15th, Maryland; 16th, Maryland; 24th, Vermont; 25th, Vermont; 27th, Vermont.

IV.—PRECIPITATION.

1. *In general.*—The general distribution of rain-fall for the month will be apparent from the accompanying Map No. III, from which it will be seen that a remarkable excess has been experienced in Minnesota and the adjacent country, as also in Nova Scotia and New Brunswick. The unequal distribution of the rain-fall, owing to the peculiar local nature of the storms of June, gives rise to the existence of innumerable small regions of from 10 to 100 miles in diameter, over which little or no rain has fallen in comparison with that experienced in the country immediately adjoining. Besides these smaller areas, larger ones have existed, as shown on the map. in Eastern

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...RATURES OF WATER FOR JUNE 1874.

	Temperatures at bottom.		Average depth of water.
	Max'm.	Min'm.	Feet.
	75	57	14
	76	76	4
	72	57	15
	64	42	21
	56	74	42
	76	50	10
	78	58	20
	70	59	16
	74	61	12
	71	51	15
	82	82	3
	80	82	1
	67	62	6
	65	78	23
	84	82	9
	84	84	5
	84	74	12
	57	42	17
	76	79	20
	76	74	15
	76	71	9
	74	60	19
	72	62	12
	74	72	28
	74	70	21
	74	46	18
	74	67	12
	—	—	4
	82	—	26
	95	72	15
	76	79	10
	84	65	18
	84	76	16
	73	57	8
	83	69	—

St. Lawrence
New England
Middle
South Atlantic
Eastern
Western
Lower Lake
Upper Lake
Upper Mississippi
Ohio Valley
Lower Mississippi
Minnesota
Pacific

R. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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Texas. Southwestern Missouri, the Lower Ohio Valley, the Middle States, Upper Canada, and the Lower Saint Lawrence Valley, in all of which less than two inches of rain have fallen. The rain-fall in Minnesota and Nebraska is generally remarked upon as the heaviest ever known to have occurred. That on the summit of Mount Washington (13.44 inches) exhibits as usual the great fluctuations of the climate of that spot.

2. *Special droughts.*—The local droughts that have occurred during the month have been specially commented upon as threatening the future harvest in New Jersey, some small sections of New York and Virginia, Southern Ohio and Indiana, and Eastern Texas.

3. *Special rains.*—Among the rain-falls remarkable for their quantity that have been particularly reported during the month, have been the following: on the 8th, at Sandwich, Ill.; 9th, Plattsmouth, Nebr.; 14th, Fort Gibson, Indian Territory, and Plattsmouth, Neb.; 24th, Indianola, Tex.

4. *Number of cloudy days.*—The number of days wholly cloudy, as reported from the Signal-Service stations, was least in the eastern portion of North Carolina, in the interior of Texas, and in Colorado, New Mexico, and Kansas, from all of which sections but one day entirely cloudy has been reported. Less than five cloudy days are reported from the Western Gulf coast, the Ohio and Lower Mississippi Valleys. From five to ten days are reported from the Middle Atlantic States and Iowa. From ten to fifteen cloudy days, and occasionally more, are reported from New England, Lakes Ontario, Huron, and Superior, and in Minnesota.

5. *Number of rainy days.*—The number of days on which some, even the slightest amount, of rain fell, at a given station, will, if combined with the quantity of rain that has fallen, give a general indication of the character of the individual rain-storms as to their gentleness or severity. Thus, over those portions of the country that have experienced more than six inches of rain, the average number of rainy days has been—on the Gulf coast, 10; in the Northwest, 18.

The average number of rainy days in districts over which the rain-fall has been from two to four inches, has been—in the Southwest, 6; on the Atlantic coast, 10; in the Middle Atlantic States, 11; and on the Middle Atlantic coast, 9.

From two to five light local showers have generally been reported from those sections of the country in which less than two inches of rain has fallen, except in the Lower Lake region, where from nine to twelve showers and sprinkles have brought only one or two inches of rain.

If the number of rainy or cloudy days is compared with the map of storm-tracks for the month, it will be found that in general the region of greatest rain or cloud frequency on the one hand accompanies the belt of storm-tracks lying, of course, somewhat to the southward thereof; and, on the other hand, these regions cover that portion of the South Atlantic and Eastern Gulf coasts over which masses of moist air have been pushed north and west up over the high land in the interior.

V.—RELATIVE HUMIDITY.

The monthly averages of relative humidity show a very uniform distribution of this element during the month. The lowest average is as usual found on the western plains, where the mean for the month, after correction for the altitude of the stations, varies between 25 and 45 per cent. The average humidity for the Ohio Valley is from 55 to 60 per cent.; that of the South Atlantic coast and Upper Lake region is 75 per cent. The highest average is 88 per cent. on Mount Washington and at Cape May, and, in general, the humidity at the stations on the immediate Middle Atlantic coast is 10 to 15 per cent. higher than at stations a hundred miles in the interior.

VI.—WINDS.

1. *In general.*—The prevailing winds of the month are shown by the arrows on map No. 2, from which it appears that southwest winds have prevailed in the Central New Jersey coast, Central Pennsylvania, Ohio, Illinois and southward to the Gulf; northwest and southwest winds over New England; west and east winds over the Lower Lake region; south and east winds over the Upper Lakes and the Northwest, and southerly winds in Texas, Louisiana, and Kansas.

2. *Special strong winds.*—The majority of winds above thirty-five or forty miles hourly velocity have been reported from stations north of the 35th parallel and west of the 85th meridian. The principal exception to this statement has been the velocity of fifty miles reported from Long Branch. The highest velocity on Mount Washington was 108 miles.

3. *Total movement of the air.*—The total movement of the air irrespective of direction has as usual been least at stations in Northern Louisiana and in the Atlantic States lying immediately among or to the eastward of the Blue Ridge. The average of six stations representing these regions, gives for the total movement of the air 2,800 miles. For the immediate South Atlantic coast, four stations, 5,000 miles; for the Middle Atlantic coast, seven stations, 7,400 miles; for the New England coast, four stations, 5,500 miles; for the extreme Northwest, six stations, 7,100 miles; for Pike's Peak, 15,700 miles; for San Francisco, 9,500 miles; for San Diego, 3,900 miles; for Portland, Oreg., 2,800 miles.

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VII.—VERIFICATION OF PREDICTIONS.

The critical comparison of the regular tri-daily Probabilities with the weather-maps for the succeeding day show that, on the average of the entire country, 86.3 per cent. of the predictions have been verified.

VIII.—NAVIGATION.

The height of water in the rivers is given in the accompanying table, from which it will be seen that no extensively dangerous river-floods have occurred. In consequence of heavy rains, local freshets have been reported on the 7th in New York and Connecticut, and, on the 12th, in New York.

The June rise in the Missouri has been well marked. The floods that prevailed in the Lower Mississippi at the beginning of the month have gradually subsided, allowing the repair of some of the more important crevasses. Observations have been reported referring to a remarkable fluctuation of the waters of Lake Superior, extending about 18 inches above and below the average level.

Height of rivers above low-water mark.

Stations.	Highest.		Lowest.	
	Date, June.	Height.	Date, June.	Height.
MISSOURI.		Ft. in.		Ft. in.
Fort Sully	3	9 10	10	7 4
Yankton	5	14 10	1	13 0
Omaha	15	12 11	1	5 0
Plattsmouth	14	6 10	1-2	†0 1
Saint Joseph	17	12 6	3	3 9
Leavenworth	17	10 0	3	1 11
Kansas City	17-19	16 2	4	7 0
Lexington	19-20	12 11	4	4 2
Brunswick	18	13 0	5	2 0
Boonville	15-17	12 10	7	1 6
Jefferson City	19	13 10	7	5 0
Hermann	19	12 5	7	4 5
MISSISSIPPI.				
Saint Paul	22-25	9 8	9-10	5 0
La Crosse	29	7 10	10-11	3 10
Le Claire	30	4 10	19	3 10
Dubuque	30	9 2	20-21	7 8
Davenport	11	7 0	21-23	4 7
Keokuk	18	7 9	23-25	5 6
Warsaw	14	8 9	26-27	5 10
Saint Louis	20	18 5	6-7	11 0
Cairo	22	18 4	10-11	10 10
Memphis	24-25	14 8	13-14	9 4
Helena	1	23 4	12	14 1
Vicksburg	1	42 8	30	22 3
New Orleans	1-2	*2 7	30	*6 6
RED RIVER.				
Shreveport	1	24 1	30	14 2
CUMBERLAND.				
Nashville	6	3 6	30	1 4
OHIO.				
Pittsburgh	14	6 0	30	1 9
Marietta	16	6 10	30	3 6
Cincinnati	21	9 8	30	6 1
Louisville	22-24	5 4	14-15	4 3
Evansville	1	5 5	15	3 10
Paducah	1	8 0	30	4 10
ALLEGHENY.				
Oil City	13	3 4	30	0 6
Freeport	13	2 0	30	†3 2
YOUGHIOGHENY.				
Confluence	12	0 0	24-25	†0 6
MONONGAHELA.				
Morgantown	11	2 11	27	0 4
New Geneva	12	0 2	27	†3 7
Brownsville	12	0 2	27	†1 9

* Below high-water mark. † Below bench-mark.

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IX.—TEMPERATURE OF WATER.

The table on Map No. III shows the maximum and minimum temperatures of the water at the stations there given. In reference to this subject, the following general remarks may be made: The average temperature of the water has been within five degrees the same as that of the air, except for the Lower Missouri, Lakes Superior, Huron, and Champlain, and the coast of Maine. The range of temperature has been: In the Lower Missouri, 16 degrees; in the Upper Mississippi, 21; in the Ohio and tributaries, 20; on the Eastern Gulf coast, 25; on the South Atlantic coast, 8; on the Middle Atlantic coast, 14; in the Lower Lakes, 20, and in the Upper Lakes, from 15 to 30 degrees.

The difference between the maximum water temperature and the maximum air temperature has been greatest in the northern sections of the country, where it has averaged 23 degrees. The average difference for the South Atlantic and Gulf coasts is 11 degrees. In general the minimum water temperatures are higher than those of the air, the only exceptions being at Duluth and Burlington, Vermont. The average difference of these minima decreases gradually from North Carolina, where it is 15, to Maine, where it is one degree. In the waters of the Mississippi and its tributaries this difference varies between 15 and 22 degrees. At Galveston the water has thence been warmer than the air.

X.—ELECTRICAL PHENOMENA.

1. *Thunder and lightning.*—The month of June has been notable in certain sections of the country for the display of atmospheric electricity, the remarkable cases of which have naturally coincided with the dates of severe local storms as given in a preceding section. The first half of the month was in fact remarkable for an almost continuous series of displays of thunder and lightning throughout the West and Northwest. The maximum number of days on which thunder or lightning has been recorded as observed somewhere within the range of vision of the observer, has been 20 to 25 in the South Atlantic and Gulf States and Missouri. It has been observed on from 15 to 20 days in Iowa, Minnesota, Wisconsin, New York, and Maine.

2. *Auroras.*—The auroral displays, recorded in June, have sometimes evidently stood in an intimate relation to the existing thunder and lightning storms. The auroral streamers of the 7th and 8th appeared brilliant at some few places, but the others were in general very faint. The dates on which they occurred are given in the following list:

1st, in Iowa; 2nd, in Vermont; 3rd, Iowa, Minnesota, New York, and Maine; 4th, Wisconsin; 5th, Illinois and Iowa; 6th, Illinois and Maryland; 7th, Colorado, Nebraska, Wisconsin, Iowa, Michigan, Indiana, Illinois, Missouri, Ohio, Tennessee, New York, Virginia, Maryland, and Vermont; 8th, Nebraska, Illinois, Ohio, Tennessee, New York, Pennsylvania, and Maine; 9th, Vermont; 10th, Vermont; 12th, Wisconsin; 13th, Wisconsin, Vermont, and Maine; 14th, Pennsylvania, New Jersey, Connecticut, and Vermont; 15th, Connecticut; 17th, Michigan and Maryland; 18th, Pennsylvania; 21st, Vermont; 22nd, Vermont; 23rd, Vermont, 26th, Vermont and Ohio; 28th, Indiana; 30th, Ohio.

XI.—OPTICAL PHENOMENA.

1. *Solar halos.*—The solar halos most extensively observed during the month were the following: On the 3d, Massachusetts, New Hampshire, and New York; on the 15th, New Hampshire, New York, and Missouri; on the 16th, Iowa, New Hampshire, New York, and Massachusetts.

2. *Lunar halos.*—The lunar halos, so far as recorded, appear to have been very local phenomena. Those that occurred between the 22d and 27th were individually observed in one or two States; the others of the month were seen only over small sections of country.

3. *Mirage.*—Mirage has been recorded only once during the month, viz: At Oswego, on the 10th.

XII.—MISCELLANEOUS.

1. *Meteors.*—Notably bright meteors have been rather frequently observed, viz: On the 3d, in Florida; 4th, in Florida; 6th, in North Carolina; 7th, in Indian Territory and Florida; 11th, in Florida; 13th, in North Carolina and Tennessee; 14th, in Florida; 15th, in Florida; 16th, in Tennessee; 18th, in North Carolina and Pennsylvania; 22d, in Florida.

2. *Earthquakes.*—The only occurrence of this phenomena that has been reported is the slight shock that was felt on the 18th at Salt Lake City.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

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PAPER 48[10].

MONTHLY WEATHER REVIEW, JULY, 1874.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

A careful examination of the meteorological data accumulated in this office during the past month, from both the regular and volunteer observers, has rendered it necessary to consider facts referring to an unusual series of atmospheric phenomena.

The month has been particularly marked in the occurrence of severe local storms, which have, in some cases, proved greatly destructive to both life and property.

The accompanying charts show an intimate relation existing between the barometric pressure, temperature, prevailing direction of winds and moisture, in the several geographic districts, and illustrate in a forcible manner that each of the elements above named is an important but variable function of the weather, while a comparison with previous months and years would indicate that decided changes in atmospheric conditions depend more directly upon the supply of aqueous vapor.

Generally, the weather has been favorable for agricultural pursuits. This is especially so on the Pacific coast, where the yield of wheat is reported to be greater than in previous years, although there are sections in the northern portion of this region where excessive rains have been injurious, and the low temperature prevented the maturing and ripening of the grain.

It is now quite certain that the late frosts which occurred in Virginia, North Carolina, Mississippi, and Tennessee will materially reduce the fruit-crop in these regions, and that the drought in the Ohio Valley, Tennessee, and Arkansas has caused an almost total failure of the tobacco-crop. There has been a deficiency of rain in the regions north and west of the Ohio Valley, but the excess in previous months has produced excellent crops, except in limited localities, where drought or insects have completely destroyed vegetation. In some districts the agricultural interests have been improved by the occurrence of timely rains, while in others too much rain, or almost a total absence of it, has caused a total failure of particular crops.

BAROMETRIC PRESSURE.

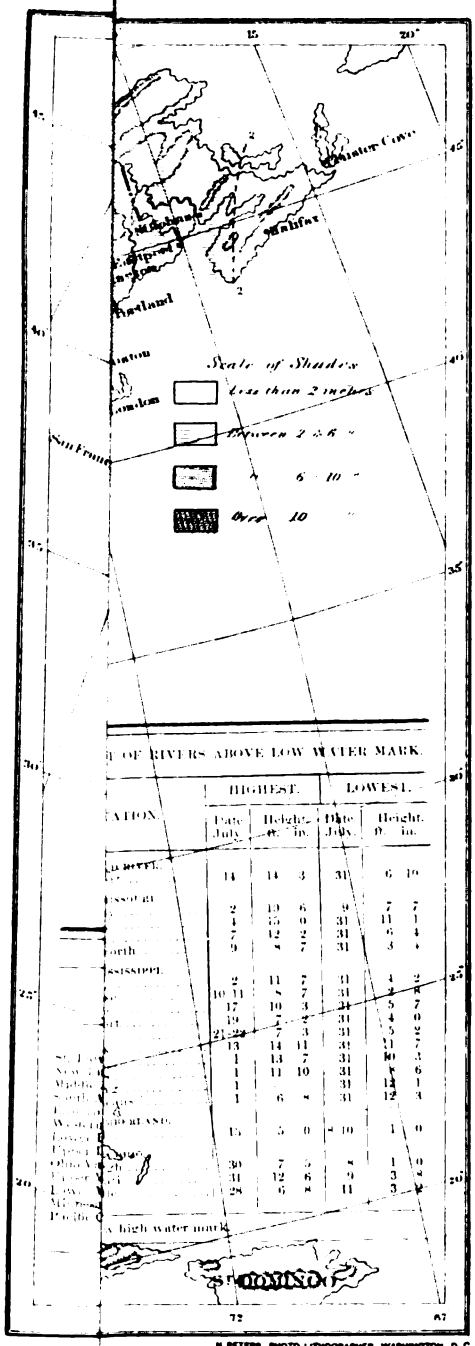
The influence of the land upon atmospheric pressure has been unusually well marked. Upon Chart No. II is represented the general distribution of this pressure for the month. A comparison of the months of June and May shows that the area of mean low barometer has moved slowly to the northeastward, and that it now extends over the centre of the continent; in the mean time the barometric pressure has increased in the southern and southeastern portions of the country, which is now within the limits of the increased area of high barometer, extending over the Atlantic between the twenty-fifth and fortieth degrees of latitude. During the past three months there has been a gradual increase of pressure in the region last named, the direction of increase being westward from the Atlantic, while during the same time there has been but little change in the mean barometric readings of the central depression. Compared with July, 1873, there has been but little change, both years showing an excess of the mean pressure previously calculated. On the Pacific coast there has been no marked variation from the monthly mean, the pressure being greatest at Portland, Oreg., and least at San Diego, Cal., thus indicating that the mean pressure on this coast increases with the latitude, within the limits of the United States, while the reverse obtains on the Atlantic coast. The barometric range is shown to be greatest in the northern districts, near the forty-fifth parallel of latitude, and from this region southward it is gradually diminished, finally becoming least in Florida.

Areas of high barometer.—These areas are not traced on the charts, but their general direction of progression has been from the northwest to the southeast; they have moved with less rapidity after reaching the Atlantic, becoming more extended in longitude, conforming to the general contour of the coast, and in some cases extending to the westward, in the direction of the Gulf coast. They have also been uniformly attended by fair weather, falling temperature, and less relative humidity, and followed by rain, especially in the Atlantic and Gulf States, after the winds had shifted to easterly.

No. I. The first area observed was central off the South Atlantic coast on the 4th, and gradually extended to the westward, apparently following and displacing the depression which existed in the Gulf during the 2d, 3d, and 4th.

No. II was central in Manitoba on the 10th, passed thence almost due east to the

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Atlantic by the afternoon of the 12th; after which the pressure increased in the Atlantic and Southern States, and on the 15th it was still traced in the southeastern portion of the country.

No. III, Observed in the Missouri Valley on the 15th, had passed from the Pacific coast southeastward to this position, after which it extended over the southern portions of the country, and disappeared on the 26th.

No. IV. During the 28th, 29th, 30th, and 31st this area moved from the Northwest to the South Atlantic coast, succeeding the depression which was attended by unusual rains in the Eastern and Middle States.

Areas of low barometer.—Eleven areas of atmospheric depression have been observed, some of which originated and disappeared within the limits of the United States, while the greater number passed to the north of the Lake region on a mean latitude greater than that of similar depressions in previous years. This fact, which was noticeable in July, 1873, is now equally marked, as will appear from the following comparative statement:

July, 1871, No. of areas of low barometer, 15; mean latitude of same, 45°.
July, 1872, No. of areas of low barometer, 14; mean latitude of same, 44°.
July, 1873, No. of areas of low barometer, 13; mean latitude of same, 47°.
July, 1874, No. of areas of low barometer, 11; mean latitude of same, 47°.

From the above it will also be observed that there has been a gradual decrease in the number of defined areas of low barometer, a fact which is also noticeable in comparing records of June with 1874 and 1873.

The approximate geographical position of the centre of each depression at each of the tri-daily reports during the time the depression remained within or near the stations of observation is given on Chart No. 1, and through these points have been traced the general course of the depression.

No. I Was apparent in Manitoba on June 30, and moved rapidly toward the Atlantic coast during July 1 and 2, following the general course of the great lakes, and moving with less progressive velocity as it approached the coast.

No. II Was attended by the unusual rains near the Gulf coast during the 2d, 3d, and 4th, and is interesting from the fact that it is the first barometric depression of the season which originated in the tropics having a progressive movement to the westward. This storm had its parallel in July of last year, but usually they are not observed within the limits of the United States until the season is more advanced. Its westerly course, with a velocity of twelve miles per hour, carried the centre of the depression slowly toward the dry and sandy plains of Texas, where it disappeared and was followed by the succeeding high barometer from the Atlantic coast, which now moved to the westward and became central in the Lower Missouri Valley on the morning of July 6. The same cause which produced the shifting of the mean tracks of barometric depressions in the temperate zone may be equally effective in changing the mean latitude of tropical storms.

No. III. The approach of this depression from the extreme Northwest was indicated by the reports from that region on the 2d of July, while No. 1 continued within the limits of the eastern station and No. 2 in an undeveloped condition in the Gulf. It passed from its initial position to the eastward as far as Lake Huron without marked results, except that on the morning of the 3d it had almost lost its identity as a defined area of low barometer, the centre of depression having increased thirty-five hundredths of an inch and the gradient diminished from 0.1 inch in eighty miles to 0.1 inch in two hundred miles. On the morning of the 4th this depression had taken the form of a slightly eccentric ellipse, the transverse axis of which coincided with the forty-fourth degree of north latitude, and was 400 miles in length.

The area of high barometer which had previously extended over the districts on the Atlantic coast, and which by its southerly wind had accumulated a supply of vapor in these districts, now moved to the south and westward, apparently drawing the depression toward the coast in the most direct line. In this, as in other storms, there has been a deviation to the south of the direct course as the depression approached the coast.

Severe local storms occurred in the southern half of this depression, while its centre was near the eastern portion of Lake Erie, the region of greatest severity being near the Atlantic coast, and including New Jersey, Delaware, Maryland, and the eastern portions of Pennsylvania and Virginia.

Nos. IV and V. No decided change occurred in the atmospheric condition within the United States until the 7th, although there seems to have been some disturbance in the Lower Saint Lawrence Valley, which caused local storms in the northern portions of New York. The general barometric depression in the Northwest, now contracted as an area of low barometer, central in the western portions of Kansas, and moved slowly to the eastward during the succeeding twenty-four hours, completely lost its cyclonic appearance in the Upper Mississippi Valley. This was succeeded by No. V, an extensive depression central in the Upper Ohio Valley, indicating an unstable condition of the

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atmosphere throughout the country east of the Mississippi River. After the barometric gradient had increased, this storm passed to the northeast to the Lower Lake region, where it seems to have been retarded, the easterly movement of its centre during thirty-six hours being less than 250 miles, while its movements in latitude were much greater.

No. VI. This disturbance was indicated by the appearance of an extended trough of barometric depression on the afternoon of July 11. It had taken the form of a circular depression, central in the Upper Ohio Valley on the succeeding morning, when a small central area could be distinctly traced. A general rain prevailed at this time in the districts of the Atlantic coast and in the Lower Lake region, the course of the storm being directly to the east, with a mean velocity of twenty-five miles per hour, and a greatest barometric gradient of 0.1 inch in fifty miles.

No. VII. Observed in the Northwest on the morning of the 14th while an area of decidedly high barometer extended over that portion of the United States south of the Lake region. These general conditions continued while this depression moved almost directly east toward the Lower Saint Lawrence Valley without producing any serious disturbance within the limits of the United States. Generally it has been observed that the relative positions of the areas of high and low barometer materially affect the course of the latter, and that the former seem to deflect the latter from their mean tracks.

Nos. VIII and IX were only partially developed areas of low barometer, central in the Northwest near the boundary of the United States on the 18th and 22d. They produced no disturbance, but caused a rise of temperature in the Mississippi Valley.

From the 21st until the 25th, the barometer continued low in the Western Territories with but slight changes of pressure within the States until the development of storm marked No. X, which can be traced to the west of the Rocky Mountains by a reference to the barometric readings taken at the stations in the Far West. This storm moved with quite a uniform velocity of about 40 miles per hour, producing heavy rains over a belt of country seven hundred miles in width, extending from the Upper Mississippi Valley to the Atlantic coast. The midnight reports of July 26 shows that the depression divided, leaving a small elliptical area in the Ohio Valley to the southwest of Lake Erie, while the principal area was to the northeast of this position. Such a distribution of pressure would necessarily give a continuous supply of warm moist air flowing from the southeast over Ohio and Pennsylvania, while a supply of cold currents flowing from the north and west in the rear of the more advanced depression would be forced over the same region. It was the sudden interference of these currents which produced the heavy rains which occurred in Western Pennsylvania on the night of the 26th. On the morning of the 27th the depressions had again united, forming an extended but narrow trough nearly parallel to the coast, where southerly winds continued, while in the Lower Lake region and the Saint Lawrence Valley the winds had backed to north and west. This depression did not pass directly to the Atlantic, but apparently extended over the entire country south of the Lake region, and continued until the 29th, when it was replaced by an equally extensive area of high barometer.

No. XI. The afternoon report of the 29th from the Northwest indicated the approach of this depression, but at no succeeding report could its center be more than approximately located; it passed to the north of the lakes, and was only attended by light local rains in the regions north of the Ohio Valley.

Local storms.—These storms have been particularly marked for their severity during the past month. Their occurrence seems to depend upon the relative distribution of barometric pressure considered in relation to the topography of the country. The region of greatest frequency has been in the vicinity of the Appalachian chain, where the vapor from the Gulf and the Atlantic was forced over the ascending plains by the prevailing southerly and southwesterly winds. Those producing the greatest destruction of life and property occurred on the 4th, 7th, 24th, and 26th of the month. On the afternoon of July 4 the depression already referred to as No. 3 was central near the eastern portion of Lake Erie; at midnight this depression was located near the eastern boundary of New York, south of its previous position. The sudden veering of the winds in the south and west quadrants of this area was attended by violent storms during the afternoon and evening in the States of Maryland, Virginia, Delaware, New Jersey, and Pennsylvania. From an examination of a large number of reports referring to these storms, it is shown that the regions of severity were limited in area, and that the storms uniformly approached from the northwest. The storm of the 24th occurred at Eureka, Nev., and was very destructive; but no official report has been received concerning it.

The remarks referring to the area of low barometer marked No. X, considered in connection with the peculiar arrangement of clouds at Erie, Pa., during the evening of the 26th, which was as follows: "Three distinct strata of clouds: *First*, black cumulo-stratus, moving from the southwest; *Second*, heavy cumulus well defined, moving from a little north of west; *Third*, cirro-cumulus, moving from the north," give the

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general atmospheric conditions which attended the unusually heavy rains occurring in Western Pennsylvania on that date. The official report from the observer at Pittsburgh states that the total number of lives lost at or near that city is one hundred and thirty-four, and that property valued at five hundred thousand dollars was destroyed.

PRECIPITATION.

In the construction of Chart No. 3, which is a graphical representation of the distribution of rain in the United States, the regular and volunteer reports have been combined with those furnished by Professor Kingston, of the Toronto Observatory. From the comparative tables accompanying the chart, it will be observed that the districts showing an excess over the normal are near the coast, and that the regions of excess of rain correspond with those in which the mean temperature has been below the normal. Within the large area representing less than two inches of rain there are small districts where there has been a total absence of it. Special droughts have prevailed, proving injurious to crops in Kentucky, Arkansas, Texas, Missouri, and Kansas.

Cloudy days.—The number of cloudy days reported from the Signal-Service stations average as follows: Six on the Gulf coast, eight on the South Atlantic coast, seven on the Middle Atlantic coast, twelve on the East Atlantic coast, three in the Lower Mississippi Valley, six in the Ohio Valley, seven in the Upper Mississippi Valley, four in the Lower Missouri Valley, and six in the Lake region.

Rainy days.—The number of days on which rain fell are as follows: Eleven in the Gulf States, fifteen in the South Atlantic States, eleven in New England, eleven in the Lower Lake region, nine in the Upper Lake region, eight in the Upper Mississippi Valley, seven in the Lower Mississippi Valley, and twelve over the Blue Ridge and Alleghanies.

Special rains.—Remarkably heavy rains occurred on the 3d at Wilmington, Charleston, and Savannah; on the 4th at New Orleans and Mobile; on the 12th at Hinsdale, Mass.; on the 24th at Eureka, Nev.; on the 26th at Pittsburgh and Allegheny City, Pa., and at Port Huron, Mich.; on the 27th at Rising Sun, Ind.

HUMIDITY.

During the month of July the relative humidity has averaged as follows in the different sections of the country:

On the Gulf and South and East Atlantic States, 0.75; on the New Jersey coast, 0.85; in the Lake region, 0.68; in the Lower Mississippi Valley, 0.70; in Tennessee and the Ohio and Upper Mississippi Valley, 0.62; in the Lower Missouri Valley, 0.58; at the Rocky Mountain stations, 0.41.

ATMOSPHERIC TEMPERATURE.

The mean isothermal lines for the month are represented on Chart No. II, and the comparison of the mean temperature of the several districts with that of the mean temperature of July in previous years is given in the table. It will be seen that the temperature has been above the mean in the districts of the Mississippi Valley and below it in the districts near the coast; this has been particularly noticeable on the Middle Atlantic and New England coasts and at San Francisco. The range of temperature compared to that of 1873 has diminished slightly on the Gulf coast and increased in the northern sections of the country. The unusual high temperature of 100° prevailed over an extensive region, including Indian Territory, Missouri, Kansas, Nebraska, and portions of Iowa and Arkansas, on the 25th of the month. The mean temperature at the summit of Pike's Peak was 42°; that at the summit of Mount Washington, 48°.5.

Frosts were reported on the 10th in Colorado, and on the 27th in Minnesota.

TEMPERATURE OF WATER.

The table on Chart No. III gives the maximum and minimum temperature of water by observations made at the bottom at many of the Signal-Service stations on lakes, rivers, and coasts. The range of temperature of the water on the Atlantic sea-board has been about five degrees, and on the Gulf coast seven degrees. In Lake Erie the range varies from five degrees at Buffalo to fourteen degrees at Cleveland; in Lake Michigan from nine degrees at Chicago to nineteen degrees at Milwaukee, and in Lake Superior from fourteen degrees at Marquette to twenty-one degrees at Duluth. The range averages about fourteen degrees in the Ohio, nine degrees in the Upper Mississippi, and four degrees in the Lower Missouri.

The difference between the maximum air-temperature and maximum water-temperature has been greatest on the coast of Maine and near Lake Superior, where it has averaged thirty degrees; this difference has been least in the Gulf and on the South

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Atlantic coast, where it has averaged nine degrees. At the stations on the western rivers the temperature of the air has risen from twelve to twenty-five degrees above the highest water temperature.

The minimum air temperature has been lower than the minimum water temperature at nearly all stations, the only exception being at Duluth, where the water temperature was five degrees lower than the air, and at Milwaukee and Eastport, where it has been two degrees colder. The mean temperature of the water has been slightly above the mean temperature of the air on the Gulf and South Atlantic coasts and in the Ohio, Cumberland, and Tennessee Rivers. In Lake Michigan the water has averaged colder than the air by seven degrees, in Lake Superior by fourteen degrees, and on the coast of Maine by twelve degrees.

WINDS.

Southerly winds have prevailed throughout the United States east of the Rocky Mountains. Chart No. II shows the mean direction as obtained from each of the stations of the Signal-Service, and it will be observed that these directions are generally toward the area of mean low barometer. The total atmospheric movement, independent of the direction, has been as follows in the several districts: New England, 5,280 miles; Middle Atlantic coast, 6,480 miles; interior of the Middle Atlantic States, 4,690 miles; South Atlantic coast, 4,730 miles; Gulf coast, 5,650 miles; Ohio, Tennessee, and the interior of the Gulf States, 3,360 miles; Lower Lake region, 5,710 miles; Upper Lake region, 6,370 miles; Upper Mississippi Valley, 6,395 miles; Missouri Valley, 3,517 miles. Violent winds occurred at Washington, D. C., July 4th, 60 miles; Mount Washington, N. H., July 9, 96 miles; Milwaukee, Wis., July 9, 63 miles; Long Branch, July 26, 50 miles. Tornadoes were reported at Three-Mile Bay, N. Y., July 7; Bass Harbor, Me., July 16; Lexington, Mich., July 24; South Bend, Ind., July 26.

Dove's law of gyration received four complete verifications at Signal-Service observatory in this city, with a single backing of the wind through an arc of 180 degrees.

NAVIGATION.

From the Table on Chart No. III, which gives the condition of the western rivers, it will be seen that the Mississippi and Missouri Rivers have declined slowly during the month, the lowest readings being those made on the 31st. The Ohio River experienced a sudden rise during the 26th, 27th, and 28th, which caused some damage near Cincinnati.

Comparative observations of the fluctuations of the barometer and the water in Lake Superior at Marquette, Mich., show that the mercury and the water acted together thirty-four times, and in an opposite direction fifty-nine times.

An unusual wave occurred at the east end of Lake Erie on the 25th, causing the water to rise three or four feet, the water returning to its normal condition as rapidly as it rose. A similar wave occurred at Northport, Mich., on the 31st.

ELECTRICAL PHENOMENA.

The local storms previously referred to were, in many instances, accompanied by vivid displays of lightning. The most remarkable series of thunder-storms occurred at the summit of Pike's Peak from the 14th to the 25th, during which the electrical effect was so intense as to interrupt telegraphic communication with that station. The observer reports that sharp peculiar sounds were emitted from all pointed objects, and that painful sensations were experienced in the hands and face.

A brilliant display of ball-lightning was observed at Denver, July 21, the ball exploding in full view, and the fragments re-exploding as they reached the earth; this phenomena was also observed at Keokuk, Iowa, on the 16th.

Ground-currents interfered with the working of the telegraph-line at Sandy Hook on the 4th, 11th, and 16th.

Auroras.—The auroral display during the month has in some localities been unusually brilliant; the region of greatest frequency being near the 45th parallel of latitude.

OPTICAL PHENOMENA.

The Solar Halos observed at more than one station on any particular date were those reported from New York, Indiana, and Maine, on the 1st; New York, Ohio, Illinois, and Mississippi, on the 17th; Illinois, Iowa, and Vermont, on the 21st; Tennessee and Maine, on the 31st. *Lunar Halos* were observed in Georgia and Mississippi, on the 8th; Indiana, New York, and Michigan, on the 19th; Tennessee, Georgia, and Iowa, on the 22d; Tennessee and Mississippi, on the 25th; Rhode Island and Vermont, on the 27th; and Vermont and Delaware, on the 30th.

Fog Bow.—This phenomena was observed at Oxford, Me., on the 25th.

Mirage occurred at New London on the 18th.

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MISCELLANEOUS.

Polar Bands were observed at Key West on the 4th, and at Toledo on the 1st.

Brilliant Meteors have appeared in large numbers during the month, the most noted being those observed in Indiana, Missouri, and New York, on the 3d; Kentucky, Missouri, and Tennessee, on the 7th; Nova Scotia, (near Halifax,) on the 9th; Pennsylvania and New York, on the 19th.

Earthquakes.—Light but perceptible shocks were experienced at Cairo, Ill., July 9th, at 4 p. m., and at Camp Russell, Nebr., July 23d.

VERIFICATION OF PROBABILITIES.

Probabilities.—The critical comparison between the separate items of the published tri-daily probabilities and the subsequent weather-reports, shows that on the average, during the month, 85.7 per cent. of the predictions have been well verified.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

PAPER 48[11].

MONTHLY WEATHER REVIEW, AUGUST, 1874.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In the preparation of this review, besides the regular reports from the Signal-Service stations, United States Army, and the Canadian stations, monthly metereological registers from many volunteer observers and from post-surgeons, forwarded by the Surgeon General United States Army, and other data, have been examined. The accompanying charts illustrate approximately the courses of low barometers, the curves of mean atmospheric pressure and temperature, the prevailing direction of the wind, and the distribution of rain.

The month has been characterized by an absence, comparatively, of destructive storms; by a deficiency of barometric pressure, and continued high temperatures from Southern Dakota to the Ohio Valley, and southward over the Gulf States; by extraordinary rain-falls over the Southern New England coast and Long Island; by cooler weather than usual over the Atlantic States, Lake region, and Saint Lawrence Valley; and by droughts in the Lower Lake region, Ohio Valley, Gulf States, and from Nebraska and Iowa southward, destroying crops in the two last sections.

BAROMETRIC PRESSURE.

Chart No. II shows the distribution of the pressure for the month, as represented by the curves in black. It is somewhat above the average over the Lake region. Over the remainder of the country it is below, especially from Kentucky and Tennessee to the southwest and the northwest. The latter is accounted for by the unusual number of low barometers which have moved down the Missouri Valley, while others, traced over the Lake region, left slight depressions in those sections, which gradually disappeared, some of which have been traced. An examination of Chart No. I will render this apparent.

Areas of low barometer accompanying Chart No. I show that the paths of the centres of eleven have, approximately, been traced. Their centres have been located for each synchronous observation, (three times daily,) and these connected. In case of doubt as to their positions, they were united by broken lines. Such are observed during every month, as many pass to the north of the Lower Lake region and the Saint Lawrence Valley on their way eastward. Frequently they leave minor depressions within the limit of the stations. In detail they are as follows:

No. I properly belongs to July, having moved from Dakota eastward over the Upper Lake region to the Saint Lawrence Valley on the 29th, 30th, and 31st ultimo. On the 1st and 2d instant it disappeared to the eastward, having been accompanied by generally light thunder-storms from the Lower Lakes, Ohio Valley, Tennessee, and the South Atlantic States eastward. A hurricane prevailed on Mount Washington, on the 1st, and a tornado at Troy, N. Y., on the 2d.

No. II was first felt on the 3d at the Rocky Mountain stations by cloudy, threatening,

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or rainy weather and brisk southerly winds. Very heavy hail fell on the "divide" between Denver and Colorado Springs, Col. At the latter place a bank of water passed down the creek at 7 p. m., sweeping everything, and supposed to have been caused by the hail-storm. On the 4th the barometer fell quite rapidly from the Upper Mississippi Valley westward, with increasing east to south winds. At Saint Paul violent high winds prevailed during the evening. The centre passed within the limit of the stations on the 4th, and down the Missouri Valley on the 5th, with threatening or rainy weather, from thence to the Upper Lakes. On the 6th it separated into two, one gradually disappearing over the Indian Territory, the other following the course shown on the chart. Cloudy or rainy weather accompanied it, except in the Gulf States. Remarkably heavy rains fell on the Middle Atlantic and New England coasts, with brisk and high easterly winds. Violent thunder-storms are reported as having occurred in Ohio, Indiana, New York, Pennsylvania, and North Carolina.

No. III passed to the south and east of Nova Scotia on the 6th, producing rain and brisk east to north winds in that section. It was evidently a cyclone, and most severe at some distance off the coast. A sailing-vessel reported having experienced a hurricane for eight hours upon this date in that vicinity, the wind backing from east to north.

No. IV was first observed by the falling barometer and high temperature, on the 8th and 9th, at the stations in the Rocky Mountains and the Lower Missouri Valley. From Nebraska and Iowa southward to the Gulf States the temperature continued rising, and thermometer-readings varying from 100° to 106° were reported for several days. On the 10th the centre moved within the limit of the stations; on the 11th, northeastward over Lake Superior into Canada; on the 12th, to the north of the Saint Lawrence Valley, leaving depressions in the Lower Missouri Valley and New England. Occasional rain fell during its progress over the Northwest and the Lake region, but became quite general, with severe thunder-storms in New England and the Middle States. A destructive tornado prevailed at Dixon, Ill., and a gale at Saint Paul during the night of the 10th; violent northwest winds at Davenport, Iowa, on the night of the 11th; hurricane on Mount Washington and severe thunder-storm at Berlin Heights, Ohio, on the night of the 12th.

No. V moved eastward from Dakota on the 15th, 16th, and 17th over the Upper Lake region into Canada, accompanied by occasional rain, with high winds at Saint Paul on the evening of the 16th, and a hurricane on Mount Washington during the night of the 18th.

No. VI. During the day the barometer fell very rapidly over the Northwest, with brisk south and east winds, and during the night of the 18th the central depression passed from Dakota to Minnesota, and thence, on the 19th, over Lake Superior into Canada. Rain fell in the Northwest and Lake region, and at places high winds prevailed.

No. VII advanced from Dakota on the 20th. The peculiarity of this consists in that it sent out in advance a secondary depression over the Middle Atlantic coast, producing at places severe thunder-storms. In the States east of the Rocky Mountains rainy weather accompanied them, with also severe thunder-storms in the Southern States.

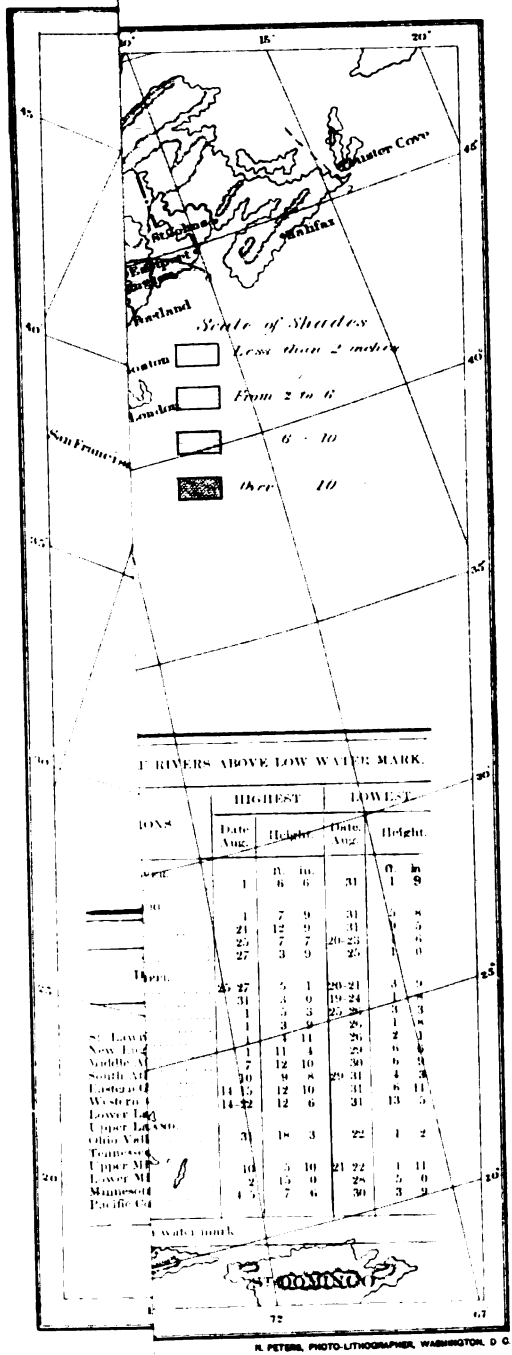
No. VIII, appearing from Dakota, moved down the Missouri Valley and disappeared over the Southwest without producing any serious disturbance.

Nos. IX and X. The low barometric readings at the Rocky-Mountain stations on the 26th and 27th indicated the presence of a serious disturbance. On the 27th the pressure rapidly diminished from the Upper Mississippi Valley westward, and on the 28th there appeared an extensive trough of low barometer, extending from Indian Territory northward over Minnesota and Manitoba, but being lowest over the latter and the Lower Missouri Valley. Previous to this time it is probable there was one low barometer, which gradually developed into the two. From the chart it will be seen that No. IX, after separating into three distinct areas, finally disappeared in the Southern States and Ohio Valley. In their movement across the country cloudy or rainy weather became quite general, except in the West Gulf States, Lower Lake region, Middle States, and New England, with very serious and destructive storms. Heavy rains and high winds are reported from Iowa, Tennessee, Georgia, Louisiana, and no doubt occurred in all the Southern States.

No. XI was of minor importance, producing rain in Maine and the eastern British Provinces. It apparently united with No. X over the mouth of the St. Lawrence River.

Areas of high barometer.—Of the most marked, the *first* apparently extended itself southeastward, on the 2d and 3d, from Manitoba over the Lake region, and on the 4th and 5th over the Atlantic States. The *second*, following low barometer No. IV, first appeared over the Lake region, from Manitoba, on the 12th and 13th, where it remained nearly stationery until the 15th, and extended itself over the Middle States and to the East Atlantic coast on the 16th and 17th. On the 18th and 19th, the *third* gradually appeared over the Lower Lake region, Middle and South Atlantic States, which extended over the South Atlantic and East Gulf States on the 19th and 20th, and then slowly disappeared. The *fourth*, following low barometer No. VII, was felt over the

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F RIVERS ABOVE LOW WATER MARK.

	HIGHEST			LOWEST		
	Date. Aug.	Height.		Date. Aug.	Height.	
		ft.	in.		ft.	in.
	1	6	6	31	1	9
	1	7	9	31		
	21	12	9	31		
	25	7	7	20-25		
	27	3	9	25		
	25-27	5	1	20-21	3	
	31	5	0	19-24	1	
	1	5	3	25	3	
	1	3	9	25	1	
	1	4	11	26	2	
	1	11	4	29	6	
	7	12	10	30	6	
	30	9	8	29-31	4	
	14-15	12	10	31	8	
	14-22	12	6	31	13	
	31	18	3	22	1	
	10	5	10	21-22	1	
	2	15	0	28	5	
	1	7	6	30	3	

Water mark

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Lake region on the 24th, moved over New England and the Middle States on the 25th, and disappeared on the 28th in advance of depressions Nos. IX, X, and XI. On the 31st, the *fifth* moved southeastward over the Lake region, succeeding low barometers Nos. IX and X. The movement of these areas has been confined principally to the Lake region and the Atlantic States. They have been more prominent than heretofore for August, and have failed to reach the Southern and Western States, especially the Southwest and West, over which sections the barometer has continued low for longer periods than usual.

ATMOSPHERIC TEMPERATURE.

The curves, in red, upon Chart No. II, are the mean isothermal lines for the month. The table, upon the same, gives the average mean temperatures of the different geographical districts for August of this year, as well as those for a number of years. Throughout the Atlantic States it has been the coolest August for many years, and is explained by the movement of the areas of high barometers, with north and east winds, over these districts. In the Gulf States and northward to Ohio, Indiana, Illinois, Iowa, and Nebraska, it has been an extremely hot month, especially between the 4th and 14th, the thermometer ranging from 100° as high as 114° for several days at a time. In that portion west of the Mississippi the extreme heat continued for several weeks, and the mean temperature ranged from 1° to 8° above the average. This hot weathe, is intimately connected with and accounted for the deficiency in atmospheric pressurer producing southerly winds. On the Pacific coast the mean temperature is 2°.2 below, the average.

Frosts occurred on the 3d, 4th, and 5th in New York and New Jersey; on the 7th in Massachusetts; on the 17th in New Hampshire; on the 23d, 24th, 25th, 26th, 27th, and 28th in Connecticut, New York, Vermont, New Hampshire, Massachusetts, and Maine

PRECIPITATION.

Chart No. III illustrates the distribution of the rain-fall for the month. The districts in which there has been an excess or a deficiency is apparent from an examination of the table upon the same. The decided excess for New England is principally due to the very heavy rains on the southern coast, produced by low barometer No. II. The deficiency in the Lower Lake region and the Ohio Valley gave rise to droughts during the latter part of the month. In the Gulf States the deficiency, with the heat, was sufficient in a great measure to injure the crops. From Northern Texas northward to Nebraska and Iowa the extreme dryness, excessive heat, and grasshoppers at many places, destroyed all vegetation. On the Pacific coast the rain-fall has been about the average.

The number of days on which rain fell during the month averages: in New England, eight; in the Middle Atlantic States, nine; in the South Atlantic States, eleven; in the Gulf States, eight; in the Lower Lake region, five; in the Upper Lake region, nine; in the Ohio Valley and Tennessee, eight; in the Upper Mississippi Valley, eleven; in the Lower Missouri Valley, nine; in Minnesota, fifteen.

Hail fell at Troy, N. Y., on the 2d; on the "divide," between Denver and Colorado Springs, Colo., as large as walnuts, on the 3d; at Jamestown, N. Y., on the 7th; at Indianapolis, Ind., on the 7th and 9th; at Spartansburgh, S. C., Weldon and Mount Pleasant, N. C., on the 8th; at Greensboro, N. C., Rochester and Benton Centre, N. Y., on the 12th; at Lunenburgh, Vt., on the 12th and 30th; at Mount Solon, Va., on the 21st; at Pomaria, S. C., on the 24th; at Castalian Springs, Tenn., on the 29th. On Pike's Peak, Colo., rain, hail, sleet, and snow fell frequently, and often during the same storm, in succession.

HUMIDITY.

The percentages of relative humidity for the various sections average as follows: on the Gulf and South Atlantic coasts, .73; on the New England coast, .74; on the New Jersey coast, .77; in the interior of the Middle States, .66; in the Lower Lake region, .65; in the Upper Lake region, .72; in the Ohio Valley, Tennessee, and the Mississippi Valley, from Dubuque to Vicksburg, .60; in the Lower Missouri Valley, .61; in Minnesota, .74; at the Rocky-Mountain stations, (excepting Pike's Peak,) .38.

WINDS.

The arrows upon chart No. II show the prevailing winds for the month. As usual they are from the high towards the low barometer. It is most perceptible in the Mississippi Valley and westward, where the barometric gradient is the steepest, and no effect from land and sea breezes. On the Atlantic coast the prevailing winds have been from the north and east. As the high winds and gales have accompanied the movement of low barometers, they are spoken of under that heading.

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The average total atmospheric movement, independent of direction, has been as follows in the several districts: New England, 4,180 miles; Middle Atlantic coast, 7,360: interior of the Middle Atlantic States, 4,306; South Atlantic coast, 4,527; Gulf coast, 5,120; Ohio and Lower Mississippi Valleys, Tennessee and the interior of the Gulf and South Atlantic States, 3,359; Lower Lake region, 4,963; Upper Lake region, 5,675: Upper Mississippi Valley, 4,991; Missouri Valley, 5,386.

NAVIGATION.

On Chart No. III is given a table of the highest and lowest water marks during the month. The Red River has continued falling during the entire month, and was remarkably low at its close, rendering navigation difficult. The Lower Missouri, Mississippi, and Ohio Rivers experienced slight changes, and were lower at the end of the month than at the beginning. The Cumberland at Nashville fell steadily until the 22d, when it was very low, but rose sixteen feet during the last week. The only freshets reported were in Southern New England, resulting from the heavy rains of the 8th and 9th.

TEMPERATURE OF WATER.

Upon Chart No. III will be found a table giving the maximum and minimum temperatures, at the bottom, at stations on the coast, lakes, and rivers. The average range has been: in the upper lakes, 11°; in Lake Erie, 12°; in the Upper Mississippi, 14°; in the Lower Missouri, 7°; in the Ohio, 15°; on the South Atlantic coast, 11°; on the Middle Atlantic coast, 7°; on the New England coast, 7°.

For the purpose of comparing the temperatures of water and air, (observations made at 3 p. m., daily,) the following table of averages is added:

Average temperatures, August, 1874.	New England coast.	Middle Atlantic coast.	South Atlantic coast.	Gulf coast.	Lake Erie.	Alpena, (Lake Huron.)	Lake Michigan.	Lake Superior.	Ohio River.	Cumberland, (Nashville.)	Upper Mississippi.	Lower Missouri.	San Francisco.
	°	°	°	°	°	°	°	°	°	°	°	°	°
Maximum of water..	62	78	85	90	79	73	72	57	88	84	83	81	61
Maximum of air.....	81	93	95	100	90	83	91	87	99	104	98	102	71
Minimum of water..	55	70	74	80	67	64	60	56	73	73	71	74	58
Minimum of air.....	48	55	61	73	49	45	50	51	56	66	59	56	51

ELECTRICAL PHENOMENA.

In addition to thunder-storms spoken of under previous headings, there were strong ground-currents on the telegraph-line connecting Colorado Springs with the summit of Pike's Peak, Col., on the evening of the 1st. Frequent lightning was observed on the same line during the month. On the 3d heavy snow accompanied a heavy thunder-storm on Pike's Peak, from which station thunder-storms are reported as having occurred almost daily. Thunder or lightning, or both, were more frequent in the Southern and Western States, especially the latter, than in other sections.

Auroras were observed in the most northern States; that of the 14th at places in Vermont, New York, Michigan, and Wisconsin as an auroral arch.

OPTICAL PHENOMENA.

Solar halos.—Those reported most frequently are as follows: On the 4th, in Illinois: 6th and 7th, in Georgia and Maine; 9th, in New York and Ohio; 17th and 18th, in Georgia and Massachusetts; 19th and 20th, in Alabama, Georgia, Pennsylvania, New Hampshire, Massachusetts, and Maine; 22d, in Maine and New Hampshire; 23d in Kansas, Nebraska, and New Hampshire; 25th, in Massachusetts, New Hampshire, New York, and Michigan; 26th, in Iowa, Illinois, Wisconsin, Ohio, Pennsylvania, and Newfoundland; 28th, in Maine and Massachusetts; 29th, in Maine, New York, Pennsylvania, and Michigan.

Lunar halos were seen at more than one station in Maine, New York, Indiana, and Iowa on the 25th; in Georgia, Ohio, and Indiana on the 26th; in Georgia, South Carolina, and Pennsylvania on the 27th.

MISCELLANEOUS.

Meteors have been reported as seen in large numbers during the first half of the month, and principally in the Northern States. The dates upon which they were most frequent are the 1st, 2d, 3d, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, and 13th, particularly

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the 10th, in Florida, Texas, Missouri, Wisconsin, Iowa, Michigan, Illinois, Indiana, Virginias, Pennsylvania, New York, New Jersey, and Maine.

Earthquakes were felt at Clifton, San Bernadino County, Cal., during the evening of the 3d, light shock from the east; at the following points in the West Indies about noon of the 8th, but without any damage: Saint Kitts, very heavy shock, Antigua, sharp shock, and Saint Thomas, smart shock with a long rumbling before and after; at El Monte, Los Angelos County, Cal., on the 20th, rumblings of distant earthquake heard; on the 24th, mutterings in the ground during the morning; on the 25th, mutterings at intervals during the morning.

The water in Lake Champlain, at West Charlotte, Vt., has been two feet above the August average.

At Marquette, Mich., out of ninety-three observations made upon the rise and fall of the surface of the water in the lake, it acted with the barometer forty-one times and contrary to it fifty-two times.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assig'd,) Chief Signal-Officer, U. S. A.

PAPER 48[12].

MONTHLY WEATHER REVIEW, SEPTEMBER, 1874.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTORY.

The Monthly Weather Review for September is based upon reports from 442 stations, classified principally as follows:

Canadian Meteorological Service	14
United States Army Signal-Service	92
United States Army-Surgeons	45
United States Naval Hospitals	5
Volunteer Observers	286

Together with numerous extracts from logs of vessels. Destructive storms have not been numerous; the single prominent exception was No. XIII, which was only destructive in its passage from Florida to North Carolina.

The weather, in general, for the month, has been marked only by the not unusual features of droughts in some portions of the country, while other portions have experienced unusually heavy rains. These latter regions are well shown by the heavily-shaded spots on Map No. III, in Texas, the Missouri and Mississippi Valleys, and the Middle Atlantic States. Portions of Ohio, Indiana, and Illinois still continue to report a deficiency of rain-fall, thus prolonging the dry season in that region, to the great detriment of agriculture.

BAROMETRIC PRESSURE.

1. *In general.*—The general distribution of barometric pressure is seen from the isobars on Map No. II, where it appears that the highest average, 30.10, pertains to the Middle Atlantic, between Capes Hatteras and Cod, whence the pressure steadily diminished to 29.90 in Dakota. The mean 29.90 for the southern end of California seems low for that region.

2. *Areas of low barometer.*—The tracks pursued by the areas of low pressure are given on Map No. I; further details are found in the following paragraphs. It will be seen that these have, as in previous years, been frequently pushed far to the west and north, but that the better-developed, severe cyclones Nos. I, III, IV, V, and XIII have pursued tracks differing but little from their normal courses.

Storm No. I. This small but well-marked cyclonic depression became first apparent on the 1st, near Nova Scotia, but kept to the eastward of that province, and passed beyond Cape Breton, without being accompanied by high winds on the land as far as reported. In its earlier course during the latter part of August, this storm may have passed near and to the northeast of the Bermudas.

No. II. This depression moved eastward over Lake Superior to the Gulf of Saint Lawrence, followed by an area of high barometer and generally accompanied by rain in the Lower Lake region and Saint Lawrence Valley. While this disturbance was central over the Gulf of Saint Lawrence, on the 3d, a belt of notable contrasts of tem-

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perature extended from Iowa to New England, and severe gales were reported in Eastern Massachusetts, followed by rapidly-falling temperatures.

No. III. The brisk and high northeast winds that prevailed on the 3d on the western coast of Texas, appear to have been connected with the presence of a barometric depression in Northern Mexico, and which may originally have entered that country from the Pacific coast, as the barometer was below the average in Southern California during the preceding day. If a definite central area of depression existed on the 2d and 3d in Mexico and Texas, its location must have been approximately as given on the chart. The cyclonic character of the disturbance on the 4th is not well shown by our observations, but may reasonably be inferred from the severity of the gale which raged on the 4th and 5th from Galveston southward, and which resulted in a large destruction of property along that coast. The barometric disturbance undoubtedly spent itself, in great part, in Central Texas, where, however, the depression continued during the 7th, and on the 8th the existence of a storm-centre in the interior of Kansas became evident. This depression then continued its course northward to Manitoba, which it passed on the 10th.

No. IV. While the severe storm mentioned in the previous paragraph was moving northward into Texas, a similar and better developed cyclone was pursuing an almost parallel course about 1,500 miles to the eastward. The published weather-maps of the morning of the 7th show the existence of this storm a short distance southeast of Nova Scotia. Its previous history has been traced by means of the published logs of ocean-vessels, from which it appears that during the 5th the storm-centre passed a short distance southwest of the Bermudas, where the gale was quite severe; and on the 6th, recurved on its northward track, and that as early as the 2d instant its force was felt by a vessel in latitude 28° 10′ and longitude 55° 38′. The track given on Chart No. 1 may be regarded as a first approximate determination of its course, which, on the afternoon of the 7th, passed over Cape Breton Island. The lowest depression observed at Cape Breton was 28.75, which corresponds with the figures reported from ocean-vessels, by many of which the hurricane wind was described as being one of the most severe ever experienced.

No. V. The cyclone No. IV was immediately followed by No. V, which passed nearly midway between Cape Hatteras and the Bermudas on the 9th, producing high winds on the North Carolina coast. The path of this depression remained persistently some distance east of the Atlantic coast, but its centre must have passed quite near Cape Breton on the morning of the 11th.

No. VI. This depression was preceded by rain and low barometer, with southerly winds in Oregon on the 10th. It was itself first well defined on the afternoon of the 11th, when it was central in Minnesota. The cold northwesterly winds that followed in its rear gave rise to numerous rain-areas from Missouri to the Upper Lake region, while the barometric depression moved rapidly northeastward over Lake Superior and beyond our station.

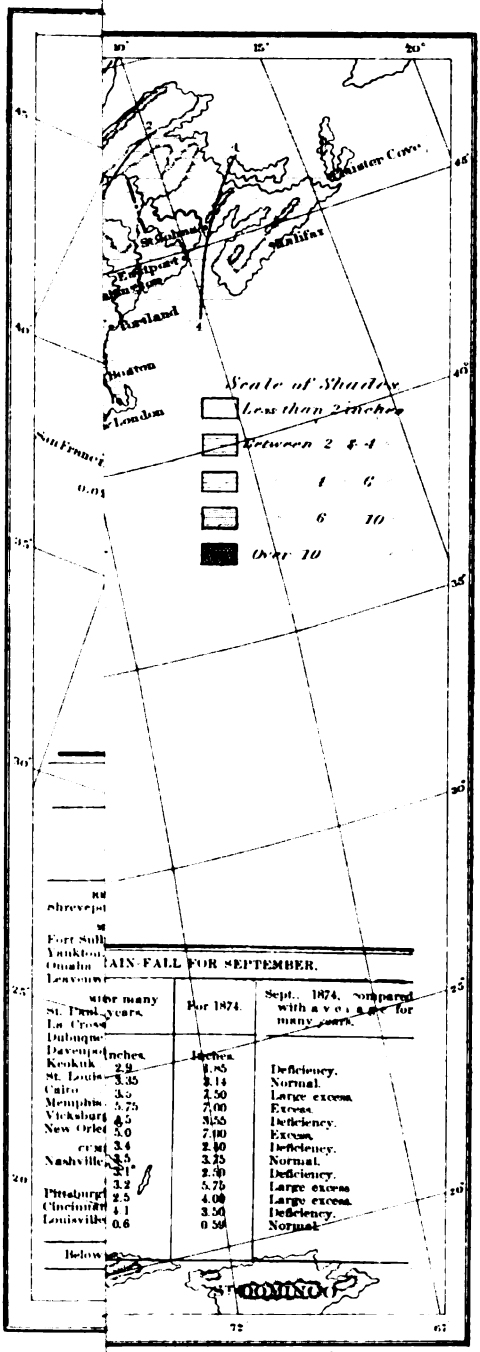
No. VII. The origin of this depression during the 13th appears to have been similar to that of area No. III, the barometer having been reported quite low during the 11th in Southern California, and the existence of a depression in Northern Mexico and Western Texas, on the 12th and 13th, may be inferred from the prevailing winds. This depression was, however, but very feebly marked, as it moved eastward, and became more or less marked by the influence of depression No. VIII to the northward. On the afternoon of the 15th, however, No. VII became distinctly separate from No. VIII, and on the morning of the 16th was central in North Carolina, while northeast winds and heavy rains extended from that State northeastward to New England. The further history of this disturbance becomes very interesting, from the fact that an unexpectedly large area of high barometer moved into the Gulf of Saint Lawrence, whence a stream of air flowed steadily for over three days from the northeast along the Middle and East Atlantic coasts, bringing cloud and rain to all that region and causing the barometric depression to dwindle away and disappear as it moved *northwestward* into Central New York. The rains of the 15th, 16th, and 17th ended the drought which had prevailed for six weeks on the Middle and East Atlantic coasts.

No. VIII. This depression, of which but slight and uncertain traces are visible previous to the afternoon of the 13th, moved eastward into Upper Canada, where it was lost sight of on the 15th.

No. IX. The low barometric pressure that prevailed on the 14th and 15th from California to Texas, was probably the initiative of a disturbance that was central on that day in Montana and on the 16th in Dakota, whence it slowly moved into Manitoba, and thence apparently eastward.

No. X. This depression developed slowly in Kansas and Northern Texas on the 16th and 17th, and was well defined on the 18th, as it passed eastward over the Lower Missouri Valley into Illinois. On this day occurred the lowest barometer during the month in Kansas, New Mexico, Colorado, &c. In the southeastern portion of Iowa and the adjacent portions of Illinois and Missouri the wind and rain on the 18th were exceedingly severe, and much damage was reported. The course of this storm-centre

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AIN-FALL FOR SEPTEMBER.

	under many years.	For 1874.	Sept., 1874, compared with average for many years.
	Inches.	Inches.	
Keokuk	2.9	1.85	Deficiency.
St. Louis	3.35	3.14	Normal.
Cairo	3.5	7.50	Large excess.
Memphis	5.75	7.00	Excess.
Vicksburg	4.5	3.55	Deficiency.
New Orleans	5.0	7.00	Excess.
	3.4	2.40	Deficiency.
Nashville	3.5	3.25	Normal.
	3.1	2.50	Deficiency.
	3.2	5.75	Large excess.
Pittsburg	2.5	4.00	Large excess.
Cincinnati	4.1	3.50	Deficiency.
Louisville	0.6	0.50	Normal.

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then turned northward over Upper Michigan into Canada, producing high southwest wind on Lakes Michigan, Erie, and Huron on the 19th.

No. XI. This disturbance was preceded by a low barometer in Southern California and probably southward over Mexico, but itself apparently had an origin on the border of Texas and Mexico on the 22d, in a manner similar to that of No. X, since it would appear that during the previous two days dry cold currents of air flowing southeastward from the extreme northwestern part of Texas underran and uplifted the warm air of the plains. On the 24th this area of low barometer passed northward over Indian Territory, and on the 25th united with No. XII, which had rapidly developed in Montana.

No. XII. The trough of low pressure that stretched during the 25th from Kansas to Manitoba had, by midnight of that day, contracted to a small area in Minnesota, which moved slowly eastward into Canada, developing a quite low central pressure, and accompanied by southerly winds and rain over the Lower Lakes on the 26th and 27th.

No. XIII. While No. XII threatened on the 26th to give rise to a very severe storm on the lakes, a notable cyclonic disturbance moved northeastward over the Gulf of Mexico, for whose early history no data have as yet been received. Its existence was first rendered evident by strong northeast winds on the Texas coast on the afternoon of the 25th, at which time the central depression must have been south of Louisiana and possibly nearer Yucatan or Mexico. During the nights of the 27th and 28th the center passed northeastwardly over Upper Florida to the coast of Georgia, pursuing a track medial between those followed by storms Nos. VI and VII of September, 1873. As the present cyclone passed along the Carolina coast on the 28th, it developed a force that has been very generally compared to the hurricane of 1854. The centre of this storm passed a short distance east of Charleston and west of Wilmington and Norfolk, crossing Chesapeake Bay on the morning of the 29th; here the violence of the winds sensibly diminished, while the barometric depression spread irregularly in various directions. After passing east of the New Jersey coast the storm seems to have turned northward through New England, and is lost sight of on the afternoon of the 30th at the mouth of the Saint Lawrence. The lowest reported barometric pressures at points near the track of the storm-center were as follows:

Lake City....	29.40	at	4	a. m., 28th.	Cape May.....	29.39	at 4.35 p. m., 29th.
Jacksonville..	29.42	at	7	a. m., 28th.	New York.....	29.37	at 11 p. m., 29th.
Savannah.....	29.40	at	9	a. m., 28th.	New Haven...	29.29	at 11.16 p. m., 29th.
Charleston....	29.06	at	1	p. m., 28th.	New London..	29.24	at 11.35 p. m., 29th.
Augusta.....	29.57	at	4	p. m., 28th.	Wood's Hole..	29.31	at 7 a. m., 30th.
Wilmington ..	29.15	at	6.15	p. m., 28th.	Boston	29.13	at 4 a. m., 30th.
Cape Henry ..	29.31?	at	11	p. m., 28th.	Portland.....	29.05	at 7.35 a. m., 30th.
Norfolk	29.41?	at	11	p. m., 28th.	Eastport.....	29.20	at 7 a. m., 30th.
Lynchburg...	29.47	at	11	p. m., 28th.	Father Point..	28.94	at 4.35 p. m., 30th.

The highest winds were: At Savannah, N.W., 36 miles; at Tybee Island, E., 60; at Charleston, E., 51, and N.W., 48; at Cape Hatteras, S.E., 75; at Wilmington, S.E., 45, and S.W., 50; at Cape Henry, 60 miles.

3. *Areas of high barometer.*—Of these areas the most notable has been No. V, which obtained its greatest development on the 18th, when it was probably central on the Gulf of Saint Lawrence.

No. I. This passed from British America on the 1st southeastward over the lakes to the Carolina coast on the 3d, followed by storm No. II on its northeastern boundary, and by the still higher pressure of the next paragraph.

No. II Is first reported in Oregon and British Columbia on the 2d. It moved southeastward over Dakota on the 3d to South Carolina and Georgia on the 8th. Clear, dry weather accompanied it over the greater part of the country, except the Texas coast, during that period.

No. III Began to press southward, over the Saint Lawrence Valley, on the 12th, and, after passing over New England, disappeared east of Cape Cod on the 15th.

No. IV Was, apparently, a western division of the same area of cold, dry air, and moved southeastward on the 12th over Dakota, disappearing on the 14th over the Lake region.

No. V Appears on the 14th as a continuation of No. IV, and extended, on the morning of that day, over the Upper Missouri Valley. It passed thence eastward to the Upper Lake region on the 16th, where it appears to have been re-enforced by further contributions from Hudson Bay and Labrador, forming an unusually extensive area of high pressure, whose centre was over the Gulf of Saint Lawrence on the 18th and 19th, where the barometric reading averaged 30.70 on the morning of the former day. The influence of this high barometer in producing continued easterly winds and rain on the New England and New Jersey coasts from the 15th to the 20th has already been alluded to.

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No. VI. The extensive area of low pressure prevailing over the Lake region on the 18th and 19th seems not only to have drawn from the northward and eastward the air that produced the high barometer of the preceding section, but also induced a flow from the south and west that gave rise to No. VI, whose existence may be traced from the Ohio Valley on the morning of the 21st, backward to Indian Territory on the 19th, and forward over Maryland on the 22d to the Middle Atlantic coast, where traces of it still remained on the 26th.

No. VII. This area began, like the preceding one, in or near Texas, and, like it, its origin is attributable to the presence of an area of low pressure, (No. XIII,) which existed on the 27th in the Gulf of Mexico. Like it, also, the highest barometer at centre moved eastward, and was not remarkably conspicuous.

ATMOSPHERIC TEMPERATURE.

The isothermal lines, as given on Chart No. II, show the average distribution of temperature during the month, which are supplemented by the small table, which gives the mean temperatures for the different geographical divisions. The cool weather of August was gradually succeeded throughout the Middle Atlantic States and neighboring sections by hot weather, accompanying the drought, the influence of which is not fully seen in the average temperatures. The extremes of temperature reported from sections in Dakota, and adjoining sections, have been quite remarkable—very hot southerly winds being reported during the 2d and 9th, followed by frost on the 15th. Frosts were reported over extensive portions of the country on the 4th and 5th in New England; on the 15th and 16th, from Michigan and Illinois to Dakota; on the 20th, 21st, and 22d, from Massachusetts and Pennsylvania to Wisconsin; on the 28th, 29th, and 30th, from Ohio to Kansas and Minnesota; besides these, frosts were reported in portions of one or two States on the 8th, 10th, 12th, 14th, 19th, 23d, 25th, 26th, and 27th.

PRECIPITATION.

Map No. III gives the details of the total amount of rain-fall for the month over the entire country, and the accompanying table shows the districts in which there has been an excess or deficiency. Remarkable rain-falls occurred on the 3d, 4th, 5th, and 6th, in Texas, accompanying storm No. III, and in Iowa, Missouri, and Illinois, on the 18th, accompanying storm No. X. The heavy rain-fall of the Middle Atlantic States occurred, principally, on the 16th, 17th, and 18th, in connection with storm No. VII, and on the 29th in connection with No. XIII.

The drought in the Middle Atlantic and Southern New England States closed on the 15th, after lasting about six weeks; that in Central New York closed on September 3d; that in Tennessee, Ohio, and Indiana, and portions of Illinois and Iowa, has been only in a slight degree abated by the light rains in those States.

The distribution of the number of rainy days exhibits, in some respects, a notable contrast to the distribution of the number of cloudy days. The greatest number of rainy days is reported from the Gulf coast, especially Florida and Texas, while the numbers reported from portions of Illinois, Iowa, Nebraska, and Michigan are but little lower. The minimum number of rainy days for the country east of the Rocky Mountains appears in the interior of New England and the basin of the Ohio. The number of cloudy days is decidedly greater on the Middle and East Atlantic coasts, reaching a maximum in Maine. The region of minimum cloudiness, averaging five or six days during the month, extends from Ohio and Illinois southward to the Gulf States.

RELATIVE HUMIDITY.

The relative humidity averages about seventy-five per cent. throughout the Gulf and Atlantic States, and diminishes as we proceed inward toward the Ohio Valley to sixty-two per cent. The averages for the Upper Lake region are seventy or seventy-five, and for the Lower Lakes about two per cent. less.

PREVAILING WINDS.

The prevailing winds exhibit, in general, a complete accord with the law according to which they should blow outward from the regions of greatest pressure. The latter region being off the Middle Atlantic coast, we find northeast winds prevailing over the South Atlantic and Gulf States, but southerly winds over Maine, Vermont, and New York. The low barometer in the Northwest has evidently determined the southerly courses of the winds from Texas to the Upper Lake region, and has had an equal influence on the northerly direction of the winds prevailing in Western Dakota. The total movement of the atmosphere irrespective of the direction has been a minimum at Memphis, and less than usual, namely, from fifteen hundred to four thousand miles, over

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Kentucky and Tennessee, and the greater portion of the States adjoining these on all sides. The greatest total movements, viz, from seven thousand to ninety-five hundred, are reported from the Texas and Middle Atlantic coasts. The maximum winds have already been mentioned in connection with the respective storms.

NAVIGATION.

On Chart No. III is given a table of the highest and lowest stages of the rivers during the month. The fluctuations have, in general, been very slight, the greatest range being that at Cairo, 10 feet. On the whole, the Missouri River, the Ohio, and the Lower Mississippi were lower during the latter part of the month than at the beginning. Destructive freshets have nowhere been reported, notwithstanding the heavy local rains reported in the Lower Missouri Valley and the Middle Atlantic coast.

TEMPERATURES OF WATER.

The observed water-temperatures have been as follows:

	Surface maximum.	Bottom minimum.
Lower Missouri River	72° to 79°	51° to 65°
Upper Mississippi River	75 to 81	65 to 66
The Red River	90	75
The Ohio River	75 to 80	60 to 70
The Gulf coast	88.5	75
South Atlantic coast	81 to 85	72 to 75
From Cape Hatteras to Cape Cod	72 to 81	63 to 70
Cape Cod to Eastport	53 to 75	49 to 66
Lake Erie	74 to 81	60 to 67
Lake Michigan	67 to 75	50 to 63
Lake Superior	63 to 66	43 to 46

In general, it will be noticed that the ranges of temperature are greatest in the Upper Lakes and the Missouri River, and least on the coast of Maine.

ATMOSPHERIC ELECTRICITY.

1. *Thunder and Lightning.*—The diminution in frequency of thunder and lightning storms during the latter part of the month has been very notable. The days of most numerous local storms, covering the greatest extent of territory, appear to have been 5th, 8th, 11th, 12th, 17th, 18th, and 26th. By far the greater number of these storms have occurred in the South Atlantic States, Mississippi Valley, and the Southwest, and a much smaller number in the Ohio Valley, Lower Lakes, Middle and Eastern States.

2. *Auroras.*—The auroral displays during September have generally been faint, although not less numerous than usual. They have been noted on the 3d, 4th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 15th, 17th, 21st, 23d, 26th, 27th, and 30th, and, as in previous months, the general relationship between auroras and thunder-storms has been well marked. The only auroras reported from more than one station were those of the 7th, seen in Maine, New York, Wisconsin, and Dakota. The 8th, seen in Dakota, Iowa, and Michigan. The 11th, seen in Maine, Wisconsin, Dakota, and Iowa. The 12th, seen in Maine, New Hampshire, Vermont, Massachusetts, New York, Michigan, Ohio, Indiana, Tennessee, and Dakota; and the 13th, seen in Massachusetts and Michigan.

OPTICAL PHENOMENA.

1. *Solar halos.*—Solar halos have been observed principally during the latter portion of the month. Those that are reported by more than one observer are as follows: On the 6th, in New Hampshire, New York, and Pennsylvania. On the 21st, in Ohio and Vermont. On the 23d, in Kansas and North Carolina. On the 24th, in Massachusetts, New Jersey, Virginia, North Carolina, Tennessee, Ohio, Indiana, and Illinois.

2. *Lunar halos.*—Lunar halos have also been observed, principally during the latter portion of the month, and as usual appear over nearly the same regions in which solar halos are observed; the former are, however, much more fully reported. The halos recorded by two or more observers are as follows: 11th, in Vermont and Indiana; 19th, in Indiana, Illinois, and Iowa; 21st, in Massachusetts, New York, New Jersey, and Ohio; 22d, in Louisiana, Indiana, and Pennsylvania; 23d, in Pennsylvania, Indiana, Illinois, Iowa, Kansas, North Carolina, and Texas; 24th, in Vermont, Pennsylvania, North Carolina, Alabama, Ohio, Illinois, Michigan, Iowa, Missouri, and Nebraska; 25th, in Vermont, Tennessee, Ohio, and Michigan; 26th, in New York, North Carolina, Georgia, and Illinois; 28th, in Vermont, New York, and Mississippi.

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MISCELLANEOUS PHENOMENA.

1. *Forest and prairie fires.*—The general dryness of the country has materially contributed to the prevalence of forest-fires during the first half of the month. These have been reported as extensive in New Jersey from the 12th to the 15th, and in Upper Canada from the 10th to the 16th. The resulting wide-spread smoke and haze was noted on the following dates: on the 1st, 2d, and 3d in Maine, Massachusetts, New York, New Jersey, Virginia, and Ohio; from the 10th to the 15th inclusive, in Maine, Massachusetts, New York, New Jersey, Virginia, Pennsylvania, Ohio, and Illinois.

2. *Migration of birds.*—The northward flight of wild geese was observed on the 6th in Colorado; 12th and 22d in Iowa; 27th, in Kansas. That of wild pigeons was observed on the 28th in Kentucky.

3. *Unusually light meteors* were observed on the 1st, 2d, 3d, 4th, 5th, 6th, 8th, 10th, 14th, 15th, 21st, 23d, 27th, 29th, and 30th. Of these, those of the 1st, 4th, 6th, 10th, 14th, and 27th were not reported from two or more stations.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Brt. Assig'd,) Chief Signal-Officer, U. S. A.

PAPER 49.

Table showing stations inspected, by whom, and when inspected.

Stations.	Name of inspector.	Date.
Albany, N. Y	First Lieut. F. C. Grugan, acting signal-officer	July 1–4, 1874.
Alpena, Mich	do	Aug. 11, 1874.
Atlantic City, N. J	Second Lieut. D. J. Gibbon, acting signal-officer	Mar. 28–30, 1874.
Augusta, Ga	First Lieut. A. W. Greely, acting signal-officer	Dec. 13–16, 1873.
Baltimore, Md	Second Lieut. Theodore Smith, acting signal-officer	Jan. 27, 28, 1874.
Bangor, Me	Second Lieut. D. J. Gibbon, acting signal-officer	Mar. 3, 4, 1874.
Barnegat, N. J	do	Mar. 27, 28, 1874.
Boston, Mass	do	Feb. 19–25, 1874.
Breckenridge, Minn	do	May 13–15, 1874.
Buffalo, N. Y	First Lieut. F. C. Grugan, acting signal-officer	July 18, 1874.
Burlington, Vt	First Lieut. A. W. Greely, acting signal-officer	Oct. 7–10, 1873.
Cairo, Ill	Second Lieut. Theodore Smith, acting signal-officer	Jan. 7, 8, 1874.
	First Lieut. F. C. Grugan, acting signal-officer	Sept. 23, 1874.
Cape May, N. J	Second Lieut. D. J. Gibbon, acting signal-officer	Mar. 31 to Apr. 2, 1874.
Charleston, S. C	First Lieut. A. W. Greely, acting signal-officer	Dec. 10, 13, 1873.
Cheyenne, Wyo	Second Lieut. D. J. Gibbon, acting signal-officer	Aug. 2–5, 1874.
Chicago, Ill	First Lieut. F. C. Grugan, acting signal-officer	Aug. 29, 1874.
Cincinnati, Ohio	Second Lieut. Theodore Smith, acting signal-officer	Dec. 21–25, 1873.
	First Lieut. F. C. Grugan, acting signal-officer	Sept. 6, 1874.
Cleveland, Ohio	do	July 25, 1874.
Colorado Springs, Colo	First Lieut. A. W. Greely, acting signal-officer	Feb. 24 to Mar. 4, 1874.
Davenport, Iowa	Second Lieut. D. J. Gibbon, acting signal-officer	Apr. 25–28, 1874.
Denver, Colo	First Lieut. A. W. Greely, acting signal-officer	Mar. 5–12, 1874.
Detroit, Mich	First Lieut. F. C. Grugan, acting signal-officer	Aug. 3, 1874.
Dubuque, Iowa	Second Lieut. D. J. Gibbon, acting signal-officer	Apr. 29 to May 1, 1874.
Duluth, Minn	do	May 6–8, 1874.
Eastport, Me	do	Mar. 6–9, 1874.
Erie, Pa	First Lieut. F. C. Grugan, acting signal-officer	July 23, 1874.
Escanaba, Mich	do	Aug. 20, 21, 1874.
Fort Gibson, Ind. T	First Lieut. A. W. Greely, acting signal officer	Feb. 18–20, 1874.
Fort Sully, Dak	Second Lieut. D. J. Gibbon, acting signal-officer	June 9–11, 1874.
Galveston, Tex	First Lieut. A. W. Greely, acting signal-officer	Jan. 31 to Feb. 5, 1874.
Grand Haven, Mich	First Lieut. F. C. Grugan, acting signal-officer	Aug. 14, 1874.
Indianapolis, Ind	Second Lieut. Theodore Smith, acting signal-officer	Dec. 26–29, 1873.
	First Lieut. F. C. Grugan, acting signal-officer	Sept. 1–5, 1874.
Indianola, Tex	First Lieut. A. W. Greely, acting signal-officer	Feb. 1, 2, 1874.
Jacksonville, Fla	do	Dec. 22–25, 1873.
Keokuk, Iowa	Second Lieut. D. J. Gibbon, acting signal-officer	Apr. 21–24, 1874.
Key West, Fla	First Lieut. A. W. Greely, acting signal-officer	Jan. 1–4, 1874.
Knoxville, Tenn	do	Apr. 2–5, 1874.
La Crosse, Wis	Second Lieut. D. J. Gibbon, acting signal-officer	May 1, 2, 1874.
Lake City, Fla	First Lieut. A. W. Greely, acting signal-officer	Dec. 20, 22, 1873.
Leavenworth, Kans	do	Mar. 14–20, 1874.
Logansport, Ind	First Lieut. F. C. Grugan, acting signal-officer	Aug. 30, 31, 1874.
Louisville, Ky	Second Lieut. Theodore Smith, acting signal-officer	Dec. 30, 1873, to Jan. 2, 1874.
	First Lieut. F. C. Grugan, acting signal-officer	Sept. 24, 1874.
Lynchburg, Va	First Lieut. A. W. Greely, acting signal-officer	Apr. 8–10, 1874.
Marquette, Mich	First Lieut. F. C. Grugan, acting signal-officer	Aug. 22, 1874.
Memphis, Tenn	Second Lieut. Theodore Smith, acting signal-officer	Jan. 9–12, 1874.
Milwaukee, Wis	First Lieut. F. C. Grugan, acting signal-officer	Aug. 19, 1874.

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Table showing stations inspected, by whom, and when inspected—Continued.

Stations.	Name of Inspector.	Date.
Mobile, Ala	First Lieut. A. W. Greely, acting signal-officer	Jan. 20–23, 1874.
Montgomery, Ala	do	Jan. 24–27, 1874.
Mount Washington, N. H.	do	Oct. 2–4, 1873.
Nashville, Tenn	Second Lieut. Theodore Smith, acting signal-officer	Jan. 3–6, 1874.
New Haven, Conn	First Lieut. A. W. Greely, acting signal-officer	Oct. 29 to Nov. 3, 1873.
New London, Conn	do	Oct. 22–28, 1873.
	Second Lieut. D. J. Gibbon, acting signal-officer	Mar. 11, 12, 1874.
New Orleans, La	Second Lieut. Theodore Smith, acting signal-officer	Jan. 16–19, 1874.
New York, N. Y	First Lieut. A. W. Greely, acting signal-officer	Nov. 3–12, 1873.
	Second Lieut. D. J. Gibbon, acting signal-officer	Mar. 13–23, 1874.
Norfolk, Va	First Lieut. A. W. Greely, acting signal-officer	Dec. 2–5, 1873.
Omaha, Neb	Second Lieut. D. J. Gibbon, acting signal-officer	June 16–25, 1874.
Oswego, N. Y	First Lieut. F. C. Grugan, acting signal-officer	July 6–11, 1874.
Peck's Beach, N. J	Second Lieut. D. J. Gibbon, acting signal-officer	Mar. 30, 31, 1874.
Pembina, Dak	do	May 24–26, 1874
Philadelphia, Pa	First Lieut. A. W. Greely, acting signal-officer	Nov. 11–15, 1873.
Pike's Peak, Colo	do	June 6–8, 1874.
Pittsburgh, Pa	Second Lieut. Theodore Smith, acting signal-officer	Dec. 18–20, 1873.
Portland, Me	Second Lieut. D. J. Gibbon, acting signal-officer	Feb. 25 to Mar. 2, 1874.
Portland, Oreg	do	Aug. 19–22, 1874.
Punta Rassa, Fla	First Lieut. A. W. Greely, acting signal-officer	Jan. 6–9, 1874.
Rochester, N. Y	First Lieut. F. C. Grugan, acting signal-officer	July 13–17, 1874.
Saint Louis, Mo	First Lieut. A. W. Greely, acting signal-officer	Mar. 24, 1874.
	First Lieut. F. C. Grugan, acting signal-officer	Sept. 17, 1874.
Saint Paul, Minn	Second Lieut. D. J. Gibbon, acting signal-officer	May 4, 5, 9–12, 1874.
Salt Lake City, Utah	do	Aug. 6–9, 1874.
San Diego, Cal	do	Sept. 5–7, 1874.
Sandy Hook, N. J	do	Mar. 23, 24, 1874.
San Francisco, Cal	do	Aug. 12–15, 1874.
Savannah, Ga	First Lieut. A. W. Greely, acting signal-officer	Dec. 16–19, 1873.
Shreveport, La	do	Feb. 6–8, 1874.
Springfield, Mass	Second Lieut. D. J. Gibbon, acting signal-officer	Feb. 18, 19, 1874.
Squan Beach, N. J	do	Mar. 25, 26, 1874.
Toledo, Ohio	First Lieut. F. C. Grugan, acting signal-officer	July 29, 1874.
Vicksburg, Miss	Second Lieut. Theodore Smith, acting signal-officer	Jan. 14–16, 1874.
Wilmington, N. C	First Lieut. A. W. Greely, acting signal-officer	Dec. 6–9, 1873.
Wood's Holo, Mass	do	Oct. 14–17, 1873.
Wytheville, Va	do	Apr. 7, 1874.
Yankton, Dak	Second Lieut. D. J. Gibbon, acting signal-officer	June 13–15, 1874.

PAPER 50.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE,
Washington, D. C., ——— —, 187—.

Sergeant ——— ———:

Observer Signal-Service, U. S. A., ———:

SERGEANT: The following instructions are furnished for the information and guidance of all observer-sergeants in charge of sea-coast stations upon the signal telegraph line extending from this Office to the coast of New Jersey:

I.—GENERAL DUTIES OF THE COAST SIGNAL-SERVICE.

Officers and enlisted men, or others of the Signal Service, employed upon sea-coast service at Light-Houses, Life-saving Stations, or points of observation, are charged with the following duties:

First. To make direct to the Chief Signal-Officer, for the information of the War, Treasury, or Navy Department, reports of all occurrences of important interest to any service of the United States.

Second. To report especially all meteoric changes and indications of approaching storms.

Third. To display, note, and exchange all necessary signals.

Fourth. To maintain necessary official communication along the coasts between the different services, and between the different coasts and Washington.

To enable the officers, non-commissioned officers, or enlisted men of the Signal Service to render with the greatest promptness the reports of information required of them, the officers and employés of other Services are requested to report to them with the least delay all important occurrences coming within the scope of the coast service.

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II.—STATION-CALLS.

Signal-Office, Washington	S. O.
Cape Hatteras	H.
Baltimore	Br.
Philadelphia	Ch.
Long Branch	U. S.
Sandy Hook	H.
Squan Beach	K.
Barnegat	Di.
Cape Henry	C.
Norfolk	X.

III.—SIGNALS.

1. Wait a minute.
4. Start me.
7. Are you ready?
8. Busy on other wire.
9. Test.
13. Do you understand?
18. What's trouble?
27. Adjust your magnet.
134. Who is writing?

Operators must in all cases give way for the signal 9.

IV.—TELEGRAPHIC REGULATIONS.

1. Each operator will have a private signal, (generally the initial letter of his name,) which must be given after the "O. K." to all telegrams received or sent.

2. Before opening the circuit, each operator must carefully adjust his relay and be certain that no other person is using the line.

3. All calls must be answered promptly.

4. The order in which the several stations shall occupy the wire for the transmission of reports and other business will be indicated by the Sergeant in Charge of the station at this Office.

The Sergeant will also have general supervision over the whole line, and his orders given by proper authority will be obeyed at all stations upon it.

Struggling for the circuit will not be permitted. Each man must take his regular turn in sending reports.

5. An operator will be on duty daily at each station from 7 a. m. until receipt of "Good-night" from this Office. At stations where the Sergeant has an Assistant, the hours of duty will be equally divided between himself and assistant, and so arranged that the night-work shall be done alternately.

6. Messages for transmission must be written on Blank No. 2.

7. The date and time at which a message is received for transmission must in all cases be plainly written by the receiver upon the margin of the message.

8. The following rules must be observed in counting words in all messages: All words will be counted, except the *date* and *place* at which the message is filed. Names of cities and places, when used to designate such cities or places, will be counted as one word—for example: New Orleans, New York, West Troy. Words connected by a hyphen, as found in Webster's Dictionary, will be counted as one word. Examples: To-day, Rail-road, Head-quarters, Aid-de-camp.

Names of persons and places, when given to things, must be counted according to the number of distinct words in each. Examples—Names of steamers: "Isaac Newton," two words; "Maid of the Mist," four words. Names of hotels: "Burnett House," two words; "United States Hotel," three words.

When there are prefixes to surnames, such as Van, Mac, or Mc, Saint or St., &c, the whole name is to be counted as one word.

9. Every message sent by telegraph must be checked at the end with the number of words it contains.

10. The receiving operator will count the number of words in each message received, and assure himself that it agrees with the check of the sending operator before giving his "O. K."

11. Messages may be shown to the senders or receivers upon personal application, or to a third person, upon their written order, and they may be allowed to make copies of the messages; but in all cases the sender or receiver, or the signature to the order, must be well known or fully identified by the operator.

12. Care must be taken in preserving and filing away messages which have been transmitted, in order to make reference thereto easy and expeditious.

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13. The Sergeant in Charge of the Long Branch office must test wires daily and ascertain the location of any interruption to the circuit, and give directions for making necessary repairs, and will have immediate supervision over the line from Sandy Hook to Barnegat. Observers at intermediate stations will report to, and promptly obey any instructions from, him in reference to this duty. All necessary repairs must be made with as little delay as practicable.

14. Observers at terminal stations will be held strictly responsible for the good condition of their batteries, which must never be wholly taken down, but cleaned and renewed by sections.

15. All messages must be transmitted precisely as they are received. No abbreviations will be used.

16. Observers will use extra caution in the transmission of proper names. The names must be written slowly, and double the usual space made between the initials.

17. In working with inexperienced operators, the words must be written slowly and plainly, and the sender assured that the message is understood.

18. When calling an office, the office calling will sign the office-signal at short intervals.

19. When leaving the office temporarily, or for the night, the main line will be cut off from the instrument. This, however, must never be done without examining the switch or cut-off, to be sure that the circuit is complete through it.

20. The ground-wire, at intermediate offices, must never be used, except in cases of breaks in the wire, and then only long enough to enable an office to do the business in hand, after which it must be instantly removed.

21. The ground-wire must never be used as a protection against lightning. During thunder-storms the main wire should be securely cut off from the instruments.

22. A copy of each message received must be kept and forwarded weekly to the Central Office with Form B.

23. A receipt must be obtained for every message delivered, which will be kept for future reference, and the time of delivery noted thereon. Proper receipt-books will be furnished by this Office.

24. A careful estimate of articles required for the succeeding quarter must be made with the report for the last month in the quarter for which the office has been supplied.

25. All instruments, relays, keys, switches, or parts of the same, refuse zinc or copper from batteries, and other property not in use, must be reported quarterly at the time of making requisition for supplies, stating number, kind, quantity, and condition of each.

26. Information will in no case be given to persons not clearly entitled to receive it, concerning any message passed, or designed to pass, over the wires.

27. Observers and Assistant Observers are prohibited from giving copies of messages or written statements relating thereto without authority from this Office.

28. A weekly report will be made from each station of the amount and nature of repairs on that portion of the line at or near the station.

V.—GENERAL INSTRUCTIONS.

1. In making the regular meteorological observations at the sea-coast stations, the Sergeant in Charge will always note the character of the ocean-swell and the direction from which it comes, and will add the same to his telegraphic reports, using the words "Heavy," "Long," and "Light," as the case may be. When the direction from which the swell is moving is the same as that of the surface-wind given in the body of the report, no record will be made of it; but when it varies from this the direction will be given at each telegraphic report. Great care must be taken in making and reporting these observations, and the usual record of them will be kept on Form 4, for file in this office.

2. A general report will be made by telegraph, daily, at 6 p. m., to the Chief Signal-Officer by the Sergeant in Charge of each sea-coast station, unless he is otherwise instructed. This report will contain:

First. A statement of the number of vessels of each class noted by the Sergeant as passing within sight of the station during the preceding twenty-four hours, with the direction in which they were going.

Second. Names of vessels with which communication has been held during the day, and the name of code used.

Third. Number of wrecks or other marine disasters, with names of vessels, number of crew, number saved, nature of cargo, and condition at time of report, and such other specific information as may be necessary for the full information of the Departments at Washington.

Fourth. All unusual occurrences affecting the interests of the United States or the duties of the Navy, Treasury, or War Departments, with source of information.

Fifth. All unusual atmospheric phenomena.

3. All shipwrecks or other disasters occurring, or about to occur, must be promptly

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reported to this Office, that information may be given to the proper authorities at the neighboring cities, ports, and other places, to the end that assistance may, if necessary, be called for.

All reports of this nature must be addressed to the Chief Signal-Officer, who is charged with the proper communication of the intelligence to the Departments, and they must be authenticated by the signature of the Sergeant in Charge. Necessary messages from captains, crews, or passengers of vessels in distress, or official messages from any member of the Military, Revenue, the Naval, Light-House, or Life-saving Service, will be sent in like manner to this Office, whence they will be forwarded to the proper address.

In cases of need, the Sergeant will promptly communicate information along the coast to other Life-saving Stations, Light-Houses, and places from which aid may be given.

4. Each Sergeant must have a thorough knowledge of the General Service and International Signal-Codes, and the manner of using them for actual work, and to have sufficient knowledge of telegraphy to send and receive at a rate of speed of not less than ten words per minute. The Assistant Observer will be instructed on station in these subjects, and be practiced daily in their use until he becomes sufficiently informed to perform the station duty, in the sickness or absence of the Sergeant.

In using the flags of the International Code, for *practice*, the six-foot flag of the General-Service Code will be displayed at the top of *every* hoist, as a distinguishing signal, and to prevent misunderstanding on the part of vessels within sight.

Weekly reports of this instruction will be made on Form 30, and the amount of progress made by each man clearly stated under the head of "Remarks."

5. "Attention" signals or "Calls" from any passing vessel will be promptly acknowledged by the Sergeant, and all proper inquiries answered. A report of all such calls, inquiries, and answers will be made to this Office.

6. Ordinary commercial and business messages will not be received for transmission.

7. These instructions are solely for the official information of officers, enlisted men, or others employed upon the Sea-Coast Service.

By order of the Chief Signal-Officer of the Army:

H. W. HOWGATE,
Second Lieutenant and Brevet Captain, U. S. A., Acting Signal-Officer and Assistant.

PAPER 51.

WAR DEPARTMENT,
Washington City, July 30, 1874.

SIR: The Secretary of War directs that the following order be substituted for the previous memorandum in regard to the same subject, dated July 24, 1874, which will be returned to the Secretary.

ORDERS.

The Chief Signal-Officer of the Army will assume charge, subject to the direction of the Secretary of War, of the construction, operation, and maintenance of the military telegraph existing or to be established in pursuance of the following acts of Congress: "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1874, and for other purposes," approved March 3, 1873: "An act to provide for the better protection of the frontier settlements of Texas against Indians and Mexican depredations," approved June 3, 1874; "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1875, and for other purposes," approved June 23, 1874.

The expenditures in connection with the construction, operation, and maintenance of these lines must not exceed the amounts appropriated in the acts above named, and the necessary escort and transportation will be furnished by the military authorities, provided that, in the judgment of the division commanders, the troops and transportation can be spared without detriment to the service.

The Chief Signal-Officer will report monthly, in writing, the progress that has been made in the construction of the several lines placed under his charge, giving details of the cost of material, labor, and all other expenses incident thereto, which may be paid from the appropriations for the several lines.

By order of the Secretary of War:

H. T. CROSBY,
Chief Clerk.

THE CHIEF SIGNAL-OFFICER OF THE ARMY.

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PAPER 52.

WASHINGTON, D. C.,
August 15, 1874.

SIR: In pursuance of the instructions of the Honorable Secretary of War, of which a copy is herewith, you are charged with the construction of the telegraph-line provided under the "Act to provide for the better protection of the frontier settlements of Texas against Indian and Mexican depredators," approved June 3, 1874.

You will proceed, in company with Mr. Van Duzer, superintendent of construction, to San Antonio, Tex., and submit to the general commanding the district the project of construction of the line.

You will request such facilities for escort and transportation as may be necessary for a reconnaissance of the route of the line, and will then, with the least delay, proceed upon such reconnaissance.

The reconnaissance will be made as rapidly as circumstances will permit, and the route will be at the same time definitely located, if this is found possible.

You will keep a daily journal in writing, in which you will note each day the route as shown by the odometer, the distances and roads or route selected, the character of the soil and country in their reference to the erection of a telegraph-line, the facilities for procuring poles, the points from which they can be procured, the distance it will be necessary to move them, whether they must be purchased from citizens or can be had from public lands by the labor of troops; whether they can be purchased and delivered by citizens upon the route, and at what rates; whether they can be purchased standing and be prepared and placed upon the route by soldiers; at what points upon the route the depots for wire, tools, and material for construction for the different sections ought to be located; to what points in Texas these articles should be shipped for distribution to these depots, and generally such facts as your experience and that of Mr. Van Duzer will indicate as proper subjects for consideration in advance of the actual work of construction.

You will notify this Office, with as little delay as possible, of the points to which material is to be shipped in bulk to Texas, and of the amounts to each one; and you will request that arrangements be made in advance for the transportation of the material, which will be forwarded from the points to which shipped to the depots selected along the route. So soon as any route or part of a route has been located, and it has been determined upon that poles are to be there provided by the labor of troops, you will request that a working party, with suitable transportation, be ordered to report to you, provided more than one section is to be undertaken, and will cause the work of procuring poles upon the route to be at once commenced. If one section only is to be commenced, you will need to apply for escort and transportation only. It is suggested that the poles be distributed upon the route in numbers of thirty to the mile, in piles of seven and eight, at distances, by odometer, of one-fourth of a mile each.

This part of the work, which is most likely to cause uncertain delay, may be commenced on as many sections as practicable, and, if necessary, long in advance of the actual erection of the line. It seems advisable that in any country at all dangerous these "pole parties" should move by themselves, and with separate escorts, in advance of the construction parties.

So soon as a sufficient portion of the section route or routes is thus supplied, the construction parties should follow, either in two divisions, one charged with making the post-holes, and the other with the erection of the line—or both of these duties may be discharged by the same party, if, on account of dangerous country or other reasons, it is considered desirable.

By these suggestions it is endeavored to provide—

1st. That the cost of procuring poles—by far the most serious to be done—may be commenced on one or several sections in advance, to prevent delays in construction.

2d. That the parties may be so divided and employed as to be easily protected.

3d. That each party being charged with only a special portion of the work, and each succeeding one finding all but its specific portion already done, may proceed with the greatest rapidity. In very dangerous country it may be that all operations will need to be by one party, moving under a large escort and very slowly; but it is probable that such conditions will exist on a small portion only of the line.

So soon as the final parties of construction are fairly in the field and portions of the line completed, it is desirable that telegraphic communication be kept up between the posts and the working parties, and suitable arrangements will be made for this purpose.

The information had from the reconnaissance, and obtained at headquarters and the different posts, is expected to be such as will enable you definitely to advise this Office—

1st. Of the posts or places to which supplies of material are to be sent in bulk, and the quantities to be so sent.

2d. Of the depots to which you propose to distribute them upon each section.

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3d. Of the character and quantity of material necessary to be purchased for each section.

In such report you will consider as carefully as practicable, and in advance, everything which will be required, exclusive of such articles as can be had for temporary use from the Army supplies. As an instance of matters to be considered under this head, should it prove absolutely impracticable to procure poles for some parts of the route in Texas, it may be necessary to ship sawed or other poles for these portions. The number to be so estimated must of course be the minimum.

4th. Of the time probably to be required for the construction of any one section, of several sections, or of the whole number of sections.

5th. Whether it will be possible to complete the line with the present appropriation, or what parts of it can be completed.

6th. Of the force of operators which will be needed after its completion, and what provisions will probably be required to maintain and repair it after completion.

Upon all of these questions you will avail yourself of the thorough practical knowledge of Mr. Van Duzer, and you will forward with your report a report made by him, in which he will include whatever subjects he may wish to bring to the notice of this office. A detachment of non-commissioned officers and enlisted men of the Signal-Service having practical knowledge of the construction and working of telegraphs, and of sufficient force to commence one section or to permit to be distributed with the working parties upon several sections, will report to you so soon as you shall indicate place and time at which you wish them to report.

You will make monthly during the continuance of this work a report of progress, &c., giving also details of cost of material, labor, and other expenditures, so far as they may be made by you, on which will be based the report of this office to the Secretary of War.

The Chief Signal-Officer does not deem it necessary to impress upon you the need of the closest economy, and he relies upon your energy and fidelity to do all it is possible to do.

A sum of money subject to your order will be placed with the United States Treasurer at New Orleans, with which to meet any expenses properly to be charged to the sum appropriated for the construction of the line.

The duty with which you are charged is one of the first importance, and every support and assistance will be given you that is in the power of this office to render.

I am, sir, very respectfully, your obedient servant,

ALBERT J. MYER,
Brig. Gen., (Brt. Assig'd,) Chief Signal-Officer of the Army.

First Lieut. ALLYN CAPRON,
Acting Signal-Officer, Washington, D. C.

PAPER 53.

BALTIMORE, *April* 6, 1874.

SIR: The several questions upon which you have desired my opinion, I have considered with the care demanded by their importance.

The questions are these:

First. Is the act of the 24th July, 1866, entitled "An act to aid in the construction of telegraph-lines, and to secure to the Government the use of the same for postal, military, and other purposes," constitutional? And are the subsequent acts of 10th June, 1872, and 3d March, 1873, also constitutional?

Second. The Western Union and other telegraph companies having accepted the terms of the act of 24th July, 1866, what are the rights of the United States and the obligations of the companies by virtue of the same?

I proceed to consider these questions in their order.

The authority of Congress to pass the acts in question is under the provision in the eighth section of the first article of the Constitution of the United States, which gives to that body power "to regulate commerce with foreign nations and among the several States, and with the Indian tribes."

These powers, like all others vested in Congress, unless they are expressly restricted by some other provision in the Constitution, or by their very nature, are unlimited in regard to the subject with which they deal. And it is equally true that they are intended to continue as long as the Government exists. This commercial clause was designed to avert the mischief resulting from conflicting commercial regulations by the several States. It is, we know, historically true that such regulations, more than any other one cause, led to the adoption of the Constitution. Indeed, the peace and prosperity of the States demanded that legislation upon the subject should be made impossible. The end for which the power was vested in Congress, it was evident, could not be accomplished by the States. Their jurisdiction extended only over their respective limits. No regulation made by them separately could exceed those limits. Commerce, therefore, with foreign nations and among the several States could only be regulated by a

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power possessing general jurisdiction. The theory of the Constitution—and all the powers with which Congress is clothed are in accordance with that theory—is that every power which could not be exercised by the States separately should be vested in Congress. The object of the Convention was to establish a government for a great nation, and was, of course, to repose in it every authority necessary to attain that result, and to secure union and harmony at home as well as peace abroad. In relation to the powers so conferred, the Supreme Court has, over and over again, declared that they are to be construed as if there were no State governments. The constituency of the General Government are the people of the whole country; the constituency of the State governments are the people of the States, respectively. In the language of Chief Justice Marshall, in the case of McCulloch *vs.* Maryland, 4 Wheaton, 406, "If any proposition could command the universal assent of mankind, we might expect it would be this: that the Government of the Union, though limited in its powers, is supreme within its sphere of action. This would seem to result necessarily from its nature. It is the government of all; its powers are delegated by all; it represents all and acts for all." Every power incidental to those expressly granted is as much granted as the expressly granted power. And every power not limited is intended to exist during the entire continuance of the Government. The design of the framers of the Constitution was that it should be for all time, unless it should be constitutionally modified. Nor, in the exercise of the incidental powers which Congress possesses, are they limited to the use of the means known to exist at the date of the Constitution. Whatever means, therefore, may at any time, through experience, or by the discoveries of science, or in any other way, be found out, may be resorted to. To apply these remarks to the subject before me: The matters to be regulated are, first, foreign commerce; second, commerce among the States; and, third, commerce among the Indian tribes. Whatever powers are incidental to the regulation of the first, are equally incidental to the regulation of the second and third. This seems to me to be obvious. The term is found in the same section and in the same clause of the Constitution. Whatever, therefore, is commerce among the States may be regulated by Congress, as well as whatever is commerce with foreign nations. What, then, is commerce, as the term is here used? Is it traffic alone, or is it not also intercourse, and the means by which traffic and intercourse may be carried on? If any doubt existed upon such a point, it was removed by the decision of the Supreme Court of the United States in the case of Gibbons *vs.* Ogden, 9 Wheaton, 1. In that case the court said that "Commerce undoubtedly is traffic, but it is something more—it is intercourse;" and also said, "All America understands, and has uniformly understood, the word commerce to comprehend navigation. It was so understood, and must have been so understood, when the Constitution was framed." Whether the power be exclusively vested in the United States, or remains for any purpose in the States, is a proposition which I need not examine. It is, however, I think, clear from the opinion from which I have quoted that the judges who decided that case thought that the power was exclusive. Subsequent decisions of the same tribunal, or rather the opinions of some of the judges, leave this point in doubt. But there has been a uniform concurrence of views upon this point—that where, under the authority of the commercial clause, Congress has regulated to any extent commerce with foreign nations or among the several States, such regulation displaces all existing similar or inconsistent State regulations, and prohibits their adoption as long as the congressional legislation remains.

Whatever, therefore, is a regulation by Congress, and tends to accomplish the end for which the power was given, must be constitutional. No authority claimed under a State in conflict with it has any validity. Nothing that a State can do, by legislation or otherwise, can in the slightest degree limit the power. In the case already quoted, as well as in the case of McCulloch *vs.* Maryland, (4 Wheaton,) it was held that the question, what means Congress can resort to to accomplish the purpose of any granted power, is a matter entirely within its discretion. The language of the court in the latter case (p. 421) is: "Let the end be legitimate; let it be within the scope of the Constitution, and all means which are appropriate, which are plainly adapted to that end, which are not prohibited but consistent with the letter and spirit of the Constitution, are constitutional." This discretion belonging to Congress, the manner of exercising it is for them to decide. The object of the act of 24th July, 1866, as declared in its title, is to secure to the Government the use of telegraph-lines "for postal, military, and other purposes." The power to establish post-offices and post-roads, and to declare war, to raise armies, and provide navies, was expressly vested in Congress. Whatever, therefore, could aid in any way the work of the Army or the Navy or the postal service, is within the discretionary power of Congress. That the telegraph will assist in accomplishing these results is clear. In time of war or of threatened war, rapid communication between the Government and the Army may be all-important. And so in relation to the mails and the Navy. It may be vital that a fleet or a ship should sail on a certain day; that any impediments, by violence or otherwise, to the transmission of the mails may be removed at the earliest period, and this can be best accomplished through the means of information furnished by the telegraph. The operation, too, of the signal service, the beneficial use of which is now so universally acknowledged,

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cannot be accomplished by any other mode than by telegraph. Its beneficial use depends upon the receipt in Washington of information of the state of the weather in every part of the country. This information enables the Bureau to predict from day to day, with reasonable precision, the state of the weather for the next twenty-four hours. This scientific prediction may be most important to the commercial as well as to the naval marine of the country. When may a fleet or ship sail with a reasonable hope that they will encounter no extraordinary perils from the winds and waves? and when may they expect such perils? This knowledge can only be distributed throughout our ports by telegraph operated by the Bureau or controlled by it, so far as its dispatches are concerned. That the assistance of the telegraph is indispensable to these objects is obvious, and it is equally obvious that the mode in which this assistance is to be rendered should be placed in the hands and under the exclusive control of the Government. This is the purpose of the act of 1866 and the subsequent acts. Their constitutionality, therefore, in my judgment, is free of all reasonable doubt.

The next question under this head is, can the United States themselves lay a telegraph-line along the several railroads for their own use? To give them the power to communicate by telegraph and deny them the right to establish a telegraph-line seems to me to be simply absurd. That the railroads in the country have been constructed for the most part under the authority of State charters in no manner affects the question. If the United States would have had the authority, as I think they clearly would, to construct telegraph-lines over the sites occupied by the railroads, they cannot be deprived of the right to establish such lines over or along the railroads, if, by so doing, they in no way injure the working of the roads. Upon the whole, then, in reference to the question submitted to me, I am of opinion that the acts referred to of 24th July, 1866, 10th June, 1872, and 3d March, 1873, are constitutional.

Second. The Western Union and other telegraph companies having accepted the terms of the act of the 24th July, 1866, what are the rights of the United States and the obligations of the companies? The act in question conferred great privileges upon the companies. It authorized them to construct their lines through the Territories of the United States, and granted them valuable portions of the same. The rights secured to the United States are that the telegrams of every Department of the Government shall have priority over all other business, and the rates for such transmission are to be annually fixed by the Postmaster-General.

What those rates are to be is submitted to his sole judgment. The object of the act was to give to the United States the authority to use the lines generally. No limitation of the time within which such right is to be exercised is provided for. Day or night, and at any period of the day or night, the right may be exerted. Any restriction upon it might be prejudicial to the interests of the Government, and cannot, therefore, be supposed to have been intended. It may be all-important to send communications to the different branches of the Army, wherever they may be, at an instant's notice. And so in relation to the Navy. To give to the companies the authority to say when such communications shall be forwarded would be to submit to them the interests of the Government. This could never have been designed.

And upon no rule of interpretation can the act be so constructed. That the companies must have, if this right is in the United States, operators at their several stations, day and night, ready to receive and transmit all governmental dispatches that may be handed in, is within the general terms of the contract; nor is the inconvenience to the companies occasioned by this obligation greater than that which is occasioned the officers of the Government. In the Signal Bureau some one of the operators must be on hand at all times during the twenty-four hours to receive or transmit all dispatches necessary to accomplish the objects of the Bureau. The sentinels in the Army are to be posted day and night. The same is true of the watches in the naval and commercial marine. It is no answer, therefore, to the rights claimed by the United States that its enjoyment of them will cause trouble to the agents of the companies. It is a trouble, if trouble it be, which the companies have agreed to assume, and a trouble, too, which at times may be vitally important to the true interests of the Government. And for this trouble the companies have been well compensated. The privileges granted to them and the property secured to them are of great value, and may in truth be said to be essential to their welfare. I am, consequently, of opinion that the Government has a right at all times, day or night, to have their messages transmitted by the companies who have assented or may assent to the act of 24th July, 1866. I am also of opinion that the Government has a right to drop their telegrams at all intermediate stations between the place from which they are sent and the place of their ultimate destination. The right to transmit involves the right to drop, as the dropping is a practice well known and used in the transmission of telegrams.

I understand that the Western Union Company has been advised that the rights of the Government and their own are secured by the contract growing out of the act of 1866, and that the same cannot be repealed or modified by the United States. Although the United States have not attempted to exercise such a right, and the question is not

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before me, yet I deem it due to the subject to say that the idea is founded upon a misapprehension of the Constitution.

The 10th section of its first article provides that "no State shall pass any law impairing the obligation of contracts." But this restriction, by its very terms, applies only to State legislation. What Congress may do, and is authorized to do, rests upon grounds irrespective of this provision. That such is the correct view, several Judges of the Supreme Court of the United States have more than once declared in official opinions, and I am not aware that any judge of that tribunal has ever expressed a different view. The only limitation upon the power of Congress is to be found in the 5th constitutional amendment, which declares that "private property" shall not "be taken for public use without just compensation." But what is proposed by the Government in this instance is not to exercise the right of eminent domain by appropriating private property for its own use, but to insist that the companies shall comply with their engagements entered into under the authority of the act of July 24, 1866, and for which they have been fully compensated. But conceding, for argument' sake, that there is a contract between the Government and the companies who assented to the act of 1866, and that the same is protected by the constitutional clause first referred to, it is still evident that the same will not be in any way impaired by the Government's not sending their dispatches through those companies, or by constructing a telegraph-line for itself. As to the first, the Government has not agreed to send their telegrams by the companies. They have only reserved the right to do so. They may, therefore, not send any, or only a portion, of their dispatches as they may think best.

Secondly. By constructing a line for itself, running near or in juxtaposition with the existing lines, they will not violate any such supposed contract. The States may authorize competing railroads, or canals, or bridges. The question of the right in the latter instance was decided in favor of the right by the Supreme Court of the United States in the case of the Charles River Bridge *vs.* Warren Bridge, 11 Peters, 536. If a State has the authority here adjudged, *a fortiori* have the United States. I am, therefore, clearly of the opinion that the Government may construct a line of its own, and transmit all messages which it may have occasion to transmit, and that the same will, in no respect whatever, interfere with any right of the existing companies.

I remain, with regard, your obedient servant,

REVERDY JOHNSON,
Assistant Attorney-General.

Bvt. Brig. Gen. ALBERT J. MYER,
Chief Signal-Officer, Washington, D. C.

PAPER 54.

AN ACT to protect lines of telegraph constructed or used by the United States from malicious injury and obstruction.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person or persons who shall willfully or maliciously injure or destroy any of the works or property or material of any telegraphic line constructed and owned, or in process of construction, by the United States, or that may be hereafter constructed and owned or occupied and controlled by the United States, or who shall willfully or maliciously interfere in any way with the working or use of any such telegraphic line, or who shall willfully or maliciously obstruct, hinder, or delay the transmission of any communication over any such telegraphic line, shall be deemed guilty of a misdemeanor, and, on conviction thereof in any district court of the United States having jurisdiction of the same, shall be punished by a fine of not less than one hundred nor more than one thousand dollars, or with imprisonment for a term not exceeding three years, or with both, in the discretion of the court.

Approved, June 23, 1874.

PAPER 55.

OFFICE OF THE CHIEF SIGNAL OFFICER,
October 20, 1874.

SIR: Immediately upon the receipt of the first reports received from our observers relative to the aurora of the evening of the 7th of April, 1874, it became evident to me that certain features of that exhibition were of exceptionally great interest, and would, if properly investigated, prove of importance in elucidating some obscure points as to the origin, nature, and meteorological relations of auroral phenomena in general.

I accordingly began diligently the work of collecting such data as the Office was daily receiving, and while engaged upon this work the Office learned from Prof. H.

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A. Newton, of Yale College, that a similar interest in this phenomena was felt by him, and that he desired, if possible, copies of such observations relating to this aurora as the office might come into possession of.

As, however, the answers to the circular of inquiry issued by Captain Howgate, at my request, gradually came in from all parts of the country, it soon became evident that the increasing mass of crude material required careful analysis, and oftentimes necessitated further correspondence before it could be brought into a fit state for submission to yourself or Professor Newton.

Although occasional contributions of observation still continue to be received, yet the greater portion of the correspondence was concluded before the 1st of July, and it had become necessary to carry out my original intention of a detailed review and analysis of the records.

As I have not yet been able to bring this tedious work to a satisfactory conclusion, I take the liberty of presenting to you this preliminary report, in order that you may assure Professor Newton that his request will be complied with as soon as possible.

Before passing to a brief description of the material and my results, I will take the occasion to remark that the future studies of this kind would be much facilitated if observers would in general record the appearances of an aurora simultaneously, say at every quarter or half hour, or every ten minutes of Washington time.

1. The material received by me consists of reports from 71 stations, distributed as shown on the accompanying map, and which may be summarized as follows:

State.	No. of stations.	State.	No. of stations.
Canada	1	Michigan	5
Connecticut	3	Minnesota	3
Illinois	3	New Jersey	8
Indiana	1	New Hampshire	1
Indian Territory	1	New York	20
Iowa	5	Ohio	2
Maine	3	Pennsylvania	3
Maryland	1	Vermont	5
Massachusetts	2	Wisconsin	8

While many of these reports are of course meager and unsatisfactory, yet others are of sufficient fullness to justify an attempt to determine the parallax, and therefore the positions and dimensions, of the numerous well-defined arches by which this aurora was characterized.

2. The general appearance of the aurora, as seen at any one station, was simply an arch or series of arches nearly parallel to each other, and extending either from east to west or from northeast to northwest. In most of the States in the preceding list there were one or more stations at which there were visible from one to four or five such arches, but the most brilliant display was visible in Northern New York. These arches had in all cases a slow movement bodily from north to south, but occasionally halting and even retrograding in this movement, while the light composing each arch was subject to very considerable fluctuations, even to the extent of temporary disappearance, and was also subject to a wave-like movement from east to west, and the reverse. Perhaps, however, the most instructive feature of these arches was the fact that, although they generally shot over from the east to the west horizon, yet quite frequently they were seen to begin in both the east and the west, and grow in either direction toward the zenith, while very often it happened at western stations that no complete arches were observed, but only their beginnings, rising up like figures or rays in the east and northeast.

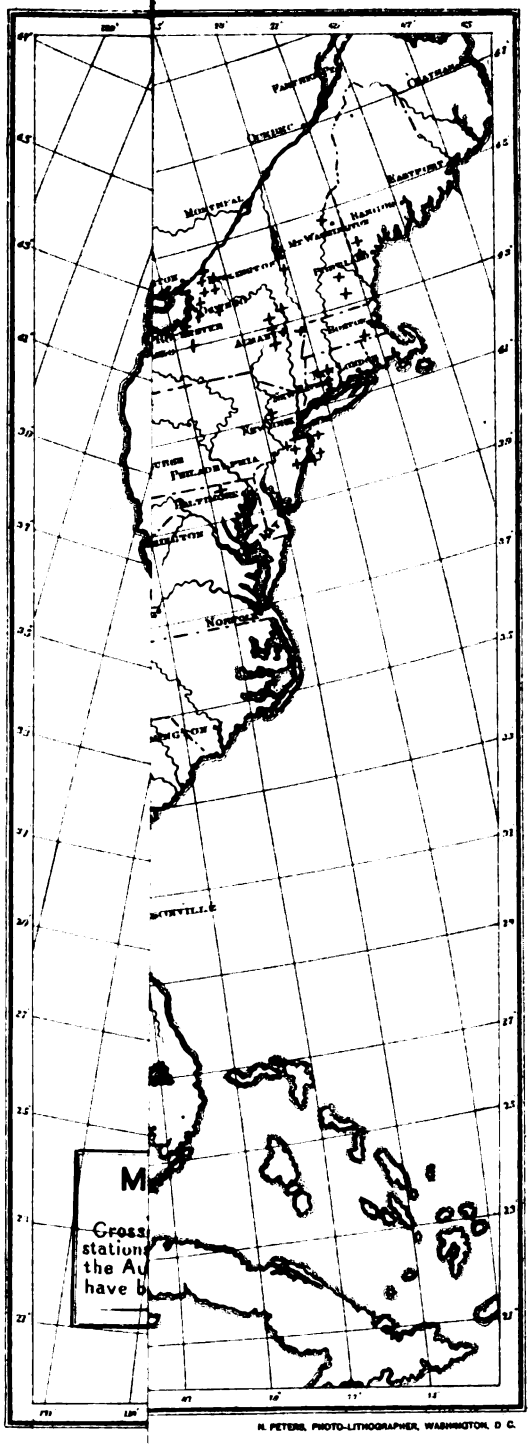
3. The display continued at favorably situated stations from sunset of the 7th to sunrise of the 8th.

4. The records of disturbances of the magnetic needle at such stations as conduct those observations show that the causes producing our aurora were felt, as is so frequently the case, throughout the whole world.

5. The difficult work of the identification of the arches seen by the observers, and the determination of their heights and distances, is not yet entirely completed, but there is reason to believe that these arches were in reality nearly parallel beams of light, stretching from New England to Michigan; that they were elevated but a few miles above the earth's surface, and were very numerous, so that rarely did two observers at distant stations see the same beams; it is possible that the western, and perhaps also the eastern, ends of the beams were higher than the central portions.

6. Like several other auroras to which I have had occasion to call attention in the "monthly reviews," so this was associated with the prevalence of numerous thunderstorms south and west of the regions experiencing the aurora, thus affording an addi-

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tional confirmation of the view that both these forms of electric manifestations are due to the same general cause. In the subsequent part of this report, I shall give reason for believing that the ultimate causes of atmospheric electricity are the friction of the particles driven by the wind and the violent seismic changes going on upon and within the earth, and to a less extent the changes occurring on the sun; but that these ultimate causes of electric excitation can only produce their visible effects (the aurora and the lightning) when the atmospheric conditions are favorable.

I have the honor to remain, very respectfully, yours,

CLEVELAND ABBE.

The CHIEF SIGNAL-OFFICER.

PAPER 56.

RELATIVE PRESSURES, OR BAROMETRIC GRADIENTS.

In all storm-warnings, the wind-velocity is the most important element to predict. This can be calculated, not from the absolute amount of depression in the storm-centre, but from the relative depression. The greater the deficiency of pressure at any one point, as compared with the surrounding pressures, it is obvious the more powerful will be the indraught thither; and hence the greater the velocity and the danger of the cyclonic winds. It is very desirable to approximately determine, in arithmetical terms, what velocity the winds will attain at a station by the difference of synchronous barometer-readings at that and the neighboring station.* This is done by ascertaining "the barometric gradient," as it has been called. The barometric gradient numerically defines the storm's violence by dividing the distance between the two places given in nautical miles, by the difference of the synchronous pressure observations.† For example, if the distance between New York and Washington be taken as one hundred and eighty-five miles, and the respective barometer-readings be 30.40 and 29.90 inches, the barometric gradient will be one inch in three hundred and seventy miles. It has been ascertained by engineers that when the barometric gradients in storms are as great as one inch of mercury in one hundred and seventy miles, the wind is high enough to overturn many houses.‡ When the barometric gradient does not exceed one inch in six hundred miles, such danger is scarcely ever to be apprehended. In regard to vessels at sea, a gradient of one inch in six hundred miles will, however, sometimes produce dangerous winds. During the Bahama hurricane, in October, 1866, the gradient was, at one time, one inch in one hundred and fifty miles, with winds blowing from eighty to one hundred and twenty miles an hour.§ The extremely steep gradients occur in nearly all the great tropical hurricanes and typhoons. The storm-disc is of small dimensions within the tropics, and the depression takes place so rapidly that the surrounding air has not time to come in and restore equilibrium gradually.

It is of the utmost consequence, for the guidance of any one predicting a dangerous wind at any point or station, to obtain an arithmetical expression of what constitutes a dangerous barometric gradient.

In the Mauritius gale of February 25, 1863, between that island and Réunion, the barometric gradient appears to have been about one inch in two hundred and ninety or three hundred miles, the wind blowing about sixty miles an hour. A very instructive record of the British storm of August 22, 1868, 6 p. m., shows, between Valencia and Liverpool, a gradient of one inch in three hundred or three hundred and fifty miles, with wind velocity rising from forty-five to sixty miles an hour.‖ On February 1, 1868, the readings were, respectively, 30.16 and 28.40 at Rochefort, France, and Aberdeen, Scotland, (difference 1.76 of an inch,) and the gradient one inch in three hundred and sixty miles. It was followed by a tremendous gale between the two points. In the European tempest of January 7, 1839, says Mr. Stevenson,¶ we find a mean gradient between Bara and Lismore of one inch in two hundred and eighty miles, and of one inch in two hundred and sixty-four miles between Lismore and Bell Rock—slopes steep enough to account for the damage done to buildings and other property. No doubt, had intermediate points of comparison been in existence, we should have found still steeper gradients. Tropical storms, from their greater violence, might be expected to occur in connection with very steep gradients, and such appears to be the case. Thus, on calculating that of the Bahama tempest, in September, 1856, we get one inch in one hundred and forty-three miles, while, during the hurricane on the Malabar coast, recorded by Colonel Sykes, the observations indicate a gradient as steep as one inch in

* See Barometer Manual of Board of Trade, London, by R. H. Scott, 1871, page 21 *et seq.*

† The "barometric gradient" was first proposed by Thomas Stevenson, esq., C. E., in a paper read before the Scottish Meteorological Society, June, 1867. See Society's Journal for January, 1868, new series, No. XVII, p. 132.

‡ See paper of Mr. Stevenson just referred to. Also Buchan's Meteorology, p. 260.

§ See Buchan, pp. 265–267.

‖ See pp. 9, 10, Non-official report of Captain Toynbee.

¶ See paper in Journal of Scottish Meteorological Society for January, 1868, p. 132.

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only fifty miles. In the great Scottish hurricane of January 23 and 24, 1868, the following invaluable observations and computations of barometric gradients were made at Aberdeen and Culloden, distant sixty-eight miles. On the 23d the following were the changes:*

Time.	Gradient.	Wind—velocity.
9 a. m.	1 inch in 167 miles.	70 miles an hour.
At noon	1 inch in 138 miles.	91 miles an hour.
1 p. m.	1 inch in 164 miles.	80 miles an hour.
3 p. m.	1 inch in 232 miles.	60 miles an hour.
Midnight	1 inch in 521 miles.	24 miles an hour.

These figures show, in general, that where the barometric gradient was about one inch in one hundred and seventy or two hundred miles, the velocity of the wind rose to more than ninety miles an hour, or the extreme hurricane-rate. There were no wind velocities reported from Aberdeen, but it is probable they were greater there than at Culloden. The preceding statements, when combined with the following, will afford the rough arithmetical approximations desired.

The following table shows characteristic barometric gradients in some of the storms reported by the Signal-Office of the United States Army:

Barometric gradients in cyclones.

Date.	Points compared between which gradient is computed.	Gradients.	Wind; velocity per hour at—	Miles.
1871.				
Aug 26, 7.35 a. m	Savannah and Augusta	1 inch in 700 miles...	Savannah	22
Nov. 12, 7.35 a. m	Chicago and Omaha	1 inch in 684 miles...	Chicago	20
Nov. 13, 4.35 p. m	Leavenworth and Fort Gibson	1 inch in 370 miles...	Leavenworth	31
Nov. 13, 11 p. m	Cairo and Dover, Tenn	1 inch in 391 miles...	Cairo	33
Nov. 14, 7.35 a. m	Chicago and Indianapolis	1 inch in 400 miles...	Chicago	33
Nov. 14, 4.35 p. m	New York and Williamsport, Pa	1 inch in 340 miles...	New York	48
Nov. 14, 4.35 p. m	Philadelphia and Harrisburgh	1 inch in 370 miles...	Philadelphia	30
Nov. 15	Portland and Albany	1 inch in 375 miles...	Portland	29
1872.				
Feb. 3, 7.35 a. m	Cape May and Norfolk	1 inch in 380 miles...	Cape May	28
Feb. 12, 4.85 p. m	Duluth and Saint Paul	1 inch in 700 miles...	Duluth	21
Feb. 13, 7.35 a. m	Chicago and Grand Haven	1 inch in 360 miles...	Chicago	31
Mar. 1, 11 p. m	Knoxville and Augusta	1 inch in 685 miles...	Knoxville	20
Mar. 8, 4.85 p. m	Detroit and Chicago	1 inch in 665 miles...	Detroit	20
Sept. 25, 7.35 a. m	Buffalo and Saugeen	1 inch in 400 miles...	Buffalo	30
Sept. 29, 7.35 a. m.	Cleveland and Detroit	1 inch in 500 miles...	Cleveland	24
Sept. 29, 7.35 a. m.	Buffalo and Detroit	1 inch in 350 miles...	Buffalo	34
1873.				
Jan. 15, 7.35 a. m.	New York and Philadelphia	1 inch in 750 miles...	New York	20
Jan. 15, 4.35 p. m	Philadelphia and Baltimore	1 inch in 750 miles...	Philadelphia	22
Mar. 13, 7.35 a. m.	Chicago and Grand Haven	1 inch in 850 miles...	Chicago	16
Mar. 24, 7.35 a. m	Toledo and Cincinnati	1 inch in 440 miles...	Toledo	26
May 9, 4.35 p. m	Nashville and Louisville	1 inch in 700 miles...	Nashville	19
May 22, 4.35 p. m	Saint Louis and Keokuk	1 inch in 800 miles...	Saint Louis	20
Aug. 23, 11 p. m	Oswego and New York	1 inch in 800 miles...	Oswego	20
Aug. 24, 7.85 a. m.	Boston and Wood's Hole	1 inch in 388 miles...	Boston	36
Nov. 16, 7.35 a. m	Cleveland and Erie	1 inch in 700 miles...	Cleveland	24
Nov. 16, 11 p. m	Jacksonville and Savannah	1 inch in 750 miles...	Jacksonville	24
Nov. 17, 7.35 a. m	Savannah and Wilmington	1 inch in 740 miles...	Savannah	24
Nov. 17, 7.35 a. m	Washington and Norfolk	1 inch in 1,000 miles	Washington	12
Nov. 17, 4.35 p. m	New London and New York	1 inch in 750 miles...	New London	24
Nov. 17, 4.35 p. m.	Washington and Norfolk	1 inch in 712 miles...	Washington	24
Nov. 17, 4.35 p. m.	New York and Cape May	1 inch in 600 miles...	New York	28
Nov. 18, 7.35 a. m	Quebec and Mount Washington	1 inch in 360 miles...	Quebec	57

In studying these data, it is of course necessary to remember that the effect of a barometric gradient will be modified by the orography and relief features of the country.† Interposing hills and mountains will make the results very different from those

* See Journal of Scottish Meteorological Society, January, 1868, p. 132 *et seq.*
† See Ferrel on Motions of Fluids and Solids relative to earth's surface, p. 51.

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produced by the same gradients in a level country. But, from all these figures and facts, we may roughly deduce some useful, approximate expressions as to what wind velocities will be likely to follow certain barometric gradients, and, also, what barometric gradients indicate peril to shipping.* The following results are tentative:

1. When the barometric gradient amounts to one inch in 750 or 800 miles, a wind blowing about 20 or 25 miles per hour may be expected. Such a wind on the Lakes is dangerous; especially is it to be apprehended in foggy, rainy, or snowy weather. When the wind reaches even 20 miles an hour on the Atlantic coast, with a heavy snow-fall, it is then dangerous to navigation. Occasionally a gradient of one inch in 800 miles has been soon followed by a wind velocity of 30 or 35 miles an hour; but such instances seem to be rare. This gradient (one inch in 750 or 800 miles) may, therefore, be called THE DANGER GRADIENT.

2. A barometric gradient of one inch in 650 miles will generally produce a wind blowing about 25 or 30 miles, or upward, except in a mountainous country.

3. A barometric gradient of one inch in 550 or 600 miles will generally be followed by a wind blowing about 30 or 35 miles an hour, the results of course as always being modified by the topography of the country.

4. If the barometric gradient is as much as one inch in 450 or 500 miles, the wind will probably blow about 35 or 40 miles an hour.

5. If the barometric gradient is one inch in 350 miles, it will be followed by a gale blowing from 45 to 50 miles an hour, though it may exceed that velocity.

6. When the gradient is as steep as one inch in 300 miles or less, almost a hurricane wind of, say, from 50t o 75 miles an hour may confidently be looked for, with still fiercer squalls.

7. No gradient less than or about one inch in 1,000 miles need be apprehended as a source of dangerous atmospheric disturbance.

It should be mentioned that, in computing the above gradients as nearly as possible, the stations compared are those lying on the same line of cyclonic indraught, *i. e.*, in the path pursued by a particle of the air, which rushes from the circumference inward to the centre of the storm.

Owing to the present difficulty of applying the proper correction of barometers for elevation, it may be best not to use these approximate results with barometric gradients computed from readings taken from high-mountain ranges or in regions rising more than 2,500 feet above the sea. It may be instructive to add to the above observations the following remarks from M. Buys Ballot, of Holland, speaking for his own country:†

"On 1st January, 1870, pressure fell from Maestricht northward to Helder, the distance being 125 miles and the difference in pressure 0.154 inch, thus giving a barometric gradient at the rate of one inch in 812 miles. The greatest force of the wind at Maestricht was 49 kilograms in the square metre, being equal to a pressure of about 11 pounds on the square foot. The direction of the arrow shows the wind was from southwest.

"From a careful examination of the large mass of details collected in the Annuaires, the following results will appear:

"1. As regards the relation of the wind to atmospheric pressure, the direction of the wind obeys the law of the relation better than the force does, nearly without exception, if pressure be higher in the south than in the north, winds in such cases being westerly. On the other hand, easterly winds do not arise so easily as westerly winds; they not only do not follow the gradients so closely, but if the difference between the gradients be not considerable, they (the easterly winds) do not follow at all.

"2. Polar winds have a different gradient from equatorial winds. Thus, if atmospheric pressure be higher in the north than in the south, a steeper gradient is required to give a pressure of six pounds to the square foot.

"3. The east and northeast winds are not only weaker with respect to the steepness of the gradients, which have to be formed, but they follow the formation of the gradients after a much longer interval of time than happens in the case of the northwest winds.

"It, indeed, frequently occurs that after a pretty steep gradient has been formed, from which an easterly wind might be looked for, rain follows, and not a very strong easterly wind. In general the northwest wind is a weak point in my predictions of weather, owing to the quickness and force with which these winds spring up after the barometric indications have appeared.

"4. The converse of this does not appear to hold good, viz, a strong wind does not arise when there has been neither a steep gradient preceding nor a great difference between two consecutive gradients.

"5. If there has been a strong wind after a steep barometric gradient, as, for example,

* See report of an inquiry into the connection between strong winds and barometrical differences, by R. H. Scott, London, 1869, pp. 3–10.

† For original authority see end of extract.

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on the occasion of the storm of the 28th of May, 1860, then the strong wind is not only preceded but is also followed by great steepness in the gradient. It often occurs after strong northwesterly winds that the gradient from Flushing to Helder or Groningen continues to be great still, and is not followed by a continuance of the storm.*

As has been already suggested, when discussing the United States Signal-Service gradients, it will always be necessary to consider the orographic and other features of the country for which high winds are computed. When the country is flat or littoral and the wind has no retarding obstacle to overcome, the velocity will be higher than when the region considered is mountainous or hilly. So in river-valleys the descending wind will blow with unrestrained force.

Generally, some hours must intervene between the formation of a steep barometric gradient and its normal consequence, a very high wind.

It may, finally, be observed that, in general, the cyclonic winds will blow in a direction varying, as regards the isobaric curves, from the tangential to the centripetal. Sometimes the high wind will be nearly tangential; but the more rapidly and suddenly the barometer falls the more nearly will its direction approach a radial line, drawn from the circumference to the centre of the disturbance. If an average angle must be indicated, it is perhaps near the truth to say that the cyclonic winds will blow across the isobaric curves at an angle of about 40° in ordinary land-storms and 60° in severe storms. But the topography of the region so modifies, in each case, the direction as well as velocity of the wind, that *no exact* arithmetical expressions can be rigidly applied. Thus, winds on the Atlantic seaboard, due to indraught from a storm-centre on the Lower Lakes, according to the law of storms, ought to be east and southeast. But the diverting influence of the Allegheny Mountains will often make them more decidedly south or southwest winds.

The meteorologist, however, by constant and close observation of the weather-map, will be enabled to predict very nearly the direction, from a judicious comparison of all the conditions. In discussing this subject, regard has been had solely to the calculation of the wind-velocity, that will follow an *already existent* barometric gradient. During the progress of the cyclone, the gradients are, however, undergoing important changes. It will, therefore, often be as important to predict a *future gradient* as to ascertain that already formed.

To predict the future gradient is very difficult, since it requires a study of the extent, direction and velocity of the movement of upper currents of the atmosphere.

But, in general, it may be stated, that the formation of new gradients, during the progress of the storm, will depend upon the amount, rapidity, and area of the rain-fall or snow-fall, accompanying the progressive depression. The greater the amount of precipitation in a given number of hours, the more marked will be the fall of the mercury in the barometer,† and the greater will be the indraught of cyclonic winds, and hence the greater the wind velocity.

The telegraphic report of the rain-fall in the previous eight hours will, therefore, furnish the storm-warner, the data for an approximate estimate of the future, or following barometric gradient.

PAPER 57.

LIST OF DISASTERS ON THE LAKES FROM JANUARY 1 TO AUGUST 31, 1874.

JANUARY.

3.—Propeller Bertschy, ran ashore in a fog, on North Point, Milwaukee; released.
Schooners J. C. Harrison, E. Corning and T. P. Sheldon damaged by freshet at Buffalo.
15.—Jessie Turner killed by fall from a vessel at Port Huron.
28.—A severe storm on Lake Michigan; propeller Bertschy and Schooner Napoleon severely handled.

FEBRUARY.

2.—Milwaukee harbor blocked with ice.
Steamer International destroyed by fire at Fort Erie.
8.—Schooner F. Morell lost foretopmast by collision with a bridge at Milwaukee.
11.—Propeller Lake Breeze broke her rudder in the ice off Milwaukee.
14.—Tug Hagerman broke wheel in ice at Milwaukee.
Propeller G. J. Truesdell broke machinery at Chicago.

* See Scottish Meteorological Journal, pp. 25, 26, New Series, Nos. XXVII XXVIII, for January and April, 1873.
† See W. C. Ley's Laws of the Winds, pp. 30–39.

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18.—Propeller Lake Breeze ran ashore at Ludington; released with little injury.
22.—Propellers Russia, Jay Gould, and schooner Annie Vought damaged by ice at Buffalo.
25.—Tug Golden City sunk by ice near Buffalo.

MARCH.

7.—Schooner Evaline lost deck-load in storm off Milwaukee.
Tug Wetzel damaged at Racine by collision with line of schooner City of Manitowoc.
21.—Steamer M. A. Thompson damaged by ice at Fort Erie.
Scow Baker damaged at Black River by being driven against schooner Turner by heavy wind.
22.—Schooners Camanche, Montauk, Forest Queen, J. Bigler, and Smith and Post damaged by storm at Oswego,
Schooner Industry struck a rock and sprang a leak, near Centreville.
30.—Steam-barge Mary Groh damaged machinery off Rocky River, Lake Erie; towed to Cleveland.
Steam-barge Sanilac and schooner Uncle Sam damaged at Port Huron by tow of steamer Ballentine.

APRIL.

1.—Schooner Louisa lost mizzen-mast by storm on Lake Huron.
2.—Schooner Eliza White damaged by storm on Lake Ontario.
Schooner E. M. Rathbun damaged by storm on Lake Ontario; Captain Cortes badly frozen.
3.—Schooner John Jewett damaged by storm on Lake Erie.
Schooner Lizzie Doak damaged by collision with a bridge at Saint Joseph.
Scow Mary and Lucy sprung a leak off Cleveland and towed back in a sinking condition.
Steamer Saginaw damaged by collision with steam-barge Nahant, at Milwaukee.
9.—Steamer Huron damaged by fire on Saginaw Bay.
Schooner Sweetheart aground in Detroit River; off.
Barge Globe driven ashore at Put-in-Bay; released and arrived at Detroit leaking.
Eight fishermen drowned off Kenosha in a gale.
11.—Scow Radical ran ashore in Milwaukee Harbor and carried away her rudder.
Scow John F. Prince ran ashore at Milwaukee; got off on the 14th, leaking badly.
George Scholz, sailor on scow Forest, drowned off Racine.
Steamer Marine City damaged by ice in Thunder Bay.
Schooner Melrose lost jib-boom off Oswego.
Steamer Carrie B. Blood damaged by fire near Port Huron.
Tug Starling damaged by ice and sunk at Belleville, Ontario.
Schooner Echo badly damaged by collision with schooner Norseman, at Charlotte, Lake Ontario.
Schooner Napoleon lost bowsprit and jib-boom by collision with schooner Beloit, off Ahnepee.
13.—Schooner Meteor water-logged and sunk off Oswego.
Schooner P. Hayden damaged by storm on Lake Michigan.
Steamer Marine City ran ashore on Belle Isle, Detroit River, and broke her wheels.
14.—Bark Montmorenci ran ashore on Long Point, Lake Erie.
Steamer Michigan and scow Charlie Crawford damaged by collision at Detroit.
Schooners Trumpff and Rutherford and propeller Asia damaged by collision at Port Dalhousie.
Propeller Dubuque and three barges ran ashore at Southeast Bend; released with little injury.
17.—Schooner Lizzie Doak damaged by collision with steamer Norseman, at Chicago.
19.—Schooner James Scott struck the pier and sank at Port Burwell.
Scow Home water-logged near Sandusky.
20.—Schooner Provost struck harbor-piers at Cleveland and was badly damaged.
Schooner Gertrude ran ashore at Port Ulao, Lake Michigan.
21.—Propeller Dunkirk grounded on bar at entrance to Saginaw River; released.
22.—Barge Susan Ward drifted ashore at Oscoda, Lake Huron.
Schooner Vienna damaged by collision with tug Morey, off Oswego.
Bark Gibraltar lost canvas and was driven back by storm, off Kingston.
23.—Tug Ida H. Lee capsized and sunk in Milwaukee Bay; James Slocum, engineer, drowned.
Scow R. H. Belcher ran ashore in a storm near harbor-pier at Milwaukee; released.

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Schooners Traveler and Waleska damaged by collision off Milwaukee.
Schooner Emma A. Mayes damaged by collision at Milwaukee.
Schooner Louisa lost jib-boom by collision with tug Shields, at Chicago.
Schooner John Kilderhouse damaged by storm off Milwaukee.
Schooner Louisa McDonald badly damaged by steamer James Couch, at Chicago.
Schooner Lucy J. Clark was run into by propeller Truesdell, at Chicago, and badly damaged.
Schooners Norman and A. Plugger damaged by collision at Chicago.
Schooner G. Barber struck on bar at Saint Joseph and sprang a leak; towed inside.

24.—Schooner Wood Duck arrived at Oswego in a water-logged condition; had a hole stove in her bottom at Presque Isle.

26.—Tug Joe Knight badly damaged by fire at Danville, Ontario.

28.—Schooner Wawanosh went ashore at False Docks, while attempting to save a man who had fallen overboard.
Schooner Australia lost jib-boom by collision, off Whitby, Lake Ontario.
Scow Selt lost centre-board on Lake Michigan.

MAY.

1.—James Colloneux, sailor on schooner Chicago Board of Trade, killed by fall from mast while schooner was fast in ice in the Straits of Mackinac.
Propeller Leland and several barges grounded on Saint Clair Flats; lightened off.
Propeller Favorite broke her wheel off Milwaukee.

2.—Propeller Champlain damaged machinery on Lake Michigan.
Schooner Gulnier lost jib-boom by collision with propeller Colorado off Milwaukee.
Schooner James Norris damaged by ice on Lake Michigan.
Bark Lafrinier damaged to the extent $1,000 by collision at Chicago.
Schooners Hungarian, Kate Gillett, and Jarvis Lord, damaged at Chicago.
Bark Carrier, scow Sea Bird, and schooners Curlew and J. B. Pomeroy, damaged by storm on Lake Michigan.
Schooner L. W. Perry ran ashore on Point Aux Barques, jettisoned 1,000 bushels wheat, and got off; arrived at Detroit in a damaged condition.

3.—Scow Sea Star pounded heavily while entering South Chicago Harbor and was seriously damaged.
Schooner Addie lost foretopmast by collision at Chicago.
Schooner Helen Blood suffered damage to extent of $2,500 by storm on Lake Michigan.
Propeller Montana damaged by ice in the Straits.
Schooner Hattie Johnson sprang a leak on Lake Erie; arrived at Detroit with 30 inches of water in hold.

4.—Bark Golden West damaged by striking harbor-piers at Milwaukee.
Propeller Missouri and schooner Aldrich damaged by collision at Milwaukee.
Schooner Norman ran ashore on Peshtigo Reef in Green Bay.
Schooner Exile aground in the Straits; released after 36 hours' delay.

7.—Schooner Bertie Calkins lost jib-boom and bowsprit by collision with schooner R. P. Mason off Big Point Sauble.
Propeller Lake Erie sprang a leak off Port Colborne.
Schooner R. P. Mason became water-logged and lost deck-load of lumber, after the collision with schooner Bertie Calkins, off Big Point Sauble.

9.—Tug E. H. Miller damaged by fire to the extent of $2,000 on Saginaw River.
Schooner Northwest ran ashore near Point Aux Barques.

5.—Schooner St. Peter sprang a leak and sank thirty-five miles off Milwaukee; crew all saved.
Tug Porter ran aground on Walpole Island, Detroit River.
Propeller Menominee broke machinery at Grand Haven and was towed to Chicago.
Schooners John Burt and Wells Burt lost their centre-boards on Lake Michigan.

10.—Schooner Octavia ran ashore at Kewaunee, Lake Michigan.
Schooner Emma and H. C. Richards, badly damaged by collision off Sheboygan.
Schooner Milan lost jib-boom at Chicago.
Schooner Octavia abandoned as a total loss.
Tug Robert Dunbar and two scows ran ashore near Ashtabula; released without injury.
Schooner Carlingford ashore at Thunder Bay Island.
Propeller Lawrence broke her wheel in Welland Canal.
Brig Baltimore damaged to extent of $500, by collision with schooner I. G. Jenkins in Welland Canal.
Propeller Messenger and brig Fountain City damaged by collision off Big Point Sauble, in a fog.

12.—Schooner Pilgrim sprang a leak at Muskegon.

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Schooner Lasalle struck on Lime-Kiln Crossing, Detroit River, and jammed her centre-board.

13.—Tug Martin Green lost smoke-stack at Chicago.
Schooner Snow Bird collided with schooner Union at Detroit.
Schooner Adirondack sprang a bad leak off Milwaukee.
Schooner D. A. Van Valkenburg and Active collided on Lake Michigan; schooner Active damaged to the extent of $500 and the other lost jib-boom and head-gear.
Steam-barge Raleigh aground on Saint Clair Flats.
A wheelman on propeller Wenona killed at Sheboygan by log striking the wheel.

14.—Scow I. N. Hill and Schooner Hamlet damaged by collision on Lake Michigan.
Tug Tawas destroyed by explosion near Port Huron; loss $4,000; Henry Chandler, second mate of schooner Z. Chandler, killed.
Schooner William Young ran ashore in Thunder Bay.
Tug F. C. Maxon and schooner Elida damaged at Chicago.
Steam-barge Mary Jarecki badly damaged by collision near Malden.
Captain Warren, of barge Niagara, fell overboard and drowned at Wenona.
Propeller City of Concord ran ashore on Feather bed Shoals near Cape Vincent; released by United States steamer Ada.

15.—Schooner Ontario ran into propeller Sovereign at Port Robinson.
Schooner Bolivia sprang a leak while loading at Oswego.
Tug Mocking-Bird broke her wheel on Lake Erie; towed to Detroit.
Propeller Annie L. Craig broke her wheel and damaged her fore-foot at Sault Ste. Marie.

16.—Tug B. W. Aldrich badly damaged by fire at Ludington, Mich; loss, $3,000.
Schooner Margaret Dall struck bottom while entering Michigan City Harbor and sprang a leak.
Schooner J. J. Hill filled and sank near wharf at Lewiston.
Propeller C. Hickox sprang a leak on Lake Erie.

17.—Tug F. C. Maxon broke cross-head in Milwaukee Bay.
Propeller Sun broke her stern-bearings in Saginaw River.
Scow Horace Greeley arrived at Collingwood in a leaking condition.
Chris. McGarry, sailor on schooner S. G. Andrews, drowned off Point Sauble.
Richard Galloway, colored fireman on steam-barge Concord, fell dead while shovelling coal on trip Tawas City to Cleveland.

18.—Schooner David Ferguson lost jib-boom by collision at Chicago.
Steamer Scotia grounded on Saint Clair Flats.
Tug Georgiana ran on rocks near Grafton, Ontario, and sank in shoal water.

20.—Tugs F. C. Maxon and W. K. Muir collided in Milwaukee Harbor; tug Maxon narrowly escaped capsizing.
Schooner Buena Vista lost jib-boom and foretopmast by collision with schooner William Aldrich at Milwaukee.
Barge Palermo grounded in canal at Sault Ste. Marie; pulled off after 24 hours' delay.
Schooner Presto sprang a leak on Lake Michigan.
Tug Chieftain broke her walking-beam near Kingston, Ontario.
Schooner George H. Ward sprang foremast on Lake Huron.
Schooner Joseph Paige sprang a leak on Lake Michigan.

21.—Scow Planet damaged by colliding with a bridge at Milwaukee.
Daniel Haley, deck-hand on propeller Annie L. Craig, killed by fall into hold, at Cleveland.

22.—Steam-barge Mary Groh sprang a leak and sank at dock at Cleveland.
Schooner McClellan arrived at Sackett's Harbor in a water-logged condition.
Schooner Kate Winslow ran on rocks at Sault Ste. Marie and sprang a leak.
Schooner Mary Nan lost jib-boom by collision at Chicago.
Schooner R. J. Gibbs lost jib-boom, head-gear, and small-boat by collision with a tow in Detroit River.

23.—Schooner Mary ran ashore at Death's Door, Lake Michigan.
Steam-barge Raleigh struck a rock in Saint Mary's River and sprang a leak.
Propeller Mayflower ran ashore on Belle Isle, Detroit River.

25.—Steam-barge Ira H. Owen arrived at Detroit leaking.
Tug F. C. Maxon became disabled in Milwaukee Bay.
Schooner M. F. Merrick arrived at Detroit leaking badly.
Tug Wetzel broke her wheel at Racine.
Schooner Alleghany ran aground on Hurson's Island, Saint Clair River.

26.—Schooner Elgin ashore near Sheboygan; released.
Schooner James Platt ran ashore on North Fox Island, Lake Michigan.
Scow Christie arrived at Milwaukee leaking.
Schooner Minnie Mueller lost jib-boom by collision at Chicago.

27.—Scow Herman lost 50,000 shingles and 9,000 feet lumber in storm on Lake Michigan.

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Schooner Sparrow damaged to extent of $500 by collision in Detroit River.
Schooner Harvest Home lost mainmast on Lake Huron.
Propeller Anna Smith and schooner James Platt arrived at Cleveland in a leaking condition.

29.—Schooner Saint Paul ran aground in Sturgeon Bay; lightened deck-load and got off.
Schooner Pride of America ran ashore in Saginaw Bay; released after 24 hours' delay.

30.—Propeller Passaic ran ashore at Fish Creek, on Green Bay; released.
Steamer Forest Queen burned at Pembroke Lake Ontario; Maggie Cavanaugh, stewardess, burned to death.

JUNE.

1.—Henry Schmidt, sailor on schooner Napoleon, drowned off Whitefish Bay, near Milwaukee.
Schooner I. N. Foster sprang a leak on Lake Michigan.

2.—Schooner Babinean run into and damaged by schooner Albacore at Kingston.

3.—Tug Little Giant broke her shaft at Chicago.
James Powers, fireman on Tug Mary A. Green, pulled overboard by tow-line and drowned, at Detroit.

4.—Schooners Annie Vought and City of the Straits damaged by a severe squall in Chicago River.
Schooner J. I. Case lost jib-boom by collision with schooner Moonlight off Beaver's Island, in a fog.
Propeller Phil Sheridan ran ashore at Scarecrow Island, Lake Huron; lightened off.

5.—Tug Starkweather blew out boiler-head at Cleveland; fireman Charles Smith scalded to death.
Schooner Edward Kelley struck on a rock and sprang a leak; repaired at Kingston.
Schooner Alida J. Rogers ran ashore on Bois Blanc Island; pulled off with little injury.

7.—Schooner Canadian capsized off Bronte, Ontario.
Schooner Exile blown to pieces by explosion of nitro-glycerine at entrance to Saint Mary's River; Captain Peterson and eight others drowned or killed.
Tugs Black Ball, Ewing, and Reciprocity lost smoke stacks, and tug Mosher damaged her stern at Chicago.

8.—Schooner Enterprise struck pier at Racine, capsized and sank; deck-load of wood lost; raised and towed into harbor.
Schooner C. C. Barnes lost bowsprit and jib-boom in a squall off Sheboygan.
Several vessels damaged at Chicago by a sudden rise of the water to the height of two feet, caused by a strong east wind.
Steam-barge Ira H. Owen, schooners A. Rust and R. Winslow damaged by collision at Chicago.
Collin Murray, sailor on schooner Tecumseh, fell into river at Goderich and was drowned.
Schooner Hattie Wells damaged to extent of $1,500 by being run into by schooner Winona, off Kewaunee.
Schooner Camden collided with scow D. R. Holt, at Milwaukee.
Steamer Nahant ran ashore at Point au Pellee, in a dense fog.

11.—Tug Alice C. Campbell broke shaft and lost her wheel at Muskegon.
Schooner Pathfinder lost foretopmast at Chicago.
Tug E. P. Ferry broke her wheel at Chicago.
Schooner Laura sprung a leak on Lake Ontario.
Schooner Morning Star lost her centre-board off Sheboygan.
Schooner Pulaski struck obstruction in Welland Canal and sprang a bad leak.
Tug Tarrant damaged by fire at Chicago to extent of $300.

12.—Scow Dan Baker sunk off Cedar Point, Lake Erie; vessel and cargo a total loss.
Schooner Pensaukee had her spars carried away by a squall off Dunkirk.
Schooner Unadilla had her main-boom broken by a squall on Lake Erie.
Barge D. M. Wilson ran upon miter-sill at the Sault Canal, and had to be lightened off.

14.—Tug Bob Anderson damaged to the extent of $1,400 by fire.

15.—Tug W. Shield broke her machinery at Chicago.
Schooner Fearless lost foremast and bowsprit on Lake Ontario.
Schooner Selkirk disabled rudder off Buffalo.
Schooner John F. Tracy ran into propeller Montgomery at Chicago; both severely damaged.
Schooner Twin-Sister sprang a leak on Lake Erie.

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Schooner Annie Falconer struck a rock and sank in Welland Canal, near Port Colborne.
William Hartnett, sailor on barge Monarch, crushed to death between barge and dock at Buffalo.
16.—Schooner Enterprise lost jib-boom, bowsprit, and head-gear by collision at Oswego.
Schooner Belle Mitchell damaged by collision with schooner Miami on Lake Michigan.
Samuel Swenson, sailor on schooner America, killed in Welland Canal by breaking of tow-line.
Steamer City of Sandusky broke wheel on Lake Erie.
Schooners Finney, Ferry, and Hartford ran upon reef between South Fox and Manitou Islands, Lake Michigan.
17.—Schooner Willie Keller run into and damaged by propeller Mohawk at Detroit.
Schooner Mollison struck reef near South Fox Island and foundered.
Schooner M. C. Upper lost bowsprit and jib-boom by collision with steam-barge Fred Kelley on Lake Huron.
Scow Skidmore sprang a leak on Lake Michigan.
Schooners Woodruff and Mocking-Bird lost topmasts on Lake Michigan.
18.—Schooner Charlie ashore on Madeline Island, Lake Superior; hole stove in bottom.
19.—Schooner Fawn cut down to water's edge on starboard side by tug Parsons, off Big Point Sauble.
20.—Schooner Shannon sprang a leak and sank near Oswego; crew saved.
Schooner Hartford struck on Lime-Kiln Reef.
Schooners America and A. Boody sprang leaks on Lake Michigan.
21.—Charles McGeehan, sailor on schooner Contest, drowned of Kenosha.
Schooner M. F. Merrick arrived at Oswego leaking badly.
Propeller Scotia ran aground on Middle Island, Lake Huron; jettisoned 50 tons Scotch pig-iron.
22.—Propeller Nassau broke her cylinder-head at Glen Harbor; towed to Milwaukee.
Propeller India broke her wheel in Neebish Rapids.
23.—Schooner Homer lost jib-boom by collision at Chicago.
Bark Lottie Wolf struck by lightning off Manitowoc, Lake Michigan.
Steamer Spartan damaged by fire at Kingston.
25.—Steamer Jarvis Lord disabled machinery at Sault Ste. Marie.
Schooner Maumee Valley ran aground at Church's, Saint Mary's River, and had to be lightened off.
Steamer Ontario damaged by storm on Lake Superior.
26.—Barge Harvest driven ashore by a squall at Turtle Bay, Detroit River.
Propeller Maine disabled machinery on Lake Huron.
John Simpson, sailor, drowned near Kingston.
27.—William Birdsell, sailor on steamer Frost, drowned on Lake Saint Clair.
Schooner E. C. Roberts broke centre-board on Lake Huron.
Schooner Delphin struck a scow while entering Ludington, Mich.; filled and sank in 30 feet of water.
28.—Schooner O. M. Bond and bark Arabia lost jib-booms by collision in Welland Canal.
Tug William Livingston broke wheel in Saint Clair River.
Schooner H. C. Deming ran aground at Buffalo.
29.—Schooners Minnie Slawson and City of Green Bay damaged by collision at Chicago.
Schooner Alida J. Rogers sprang a leak on Lake Michigan.
Schooners Annie Tomine and Lornie A. Burton damaged by collision off Chicago.
John McDermott drowned from schooner Two Fannies at Sault Ste. Marie.
Schooner Babineau and Gaudry damaged to extent of $300 by collision with Schooner Gildersleeve on Saint Clair Flats.
30.—Schooner Marengo had her fore gaff broken on Lake Michigan.
Schooner E. P. Royce lost foremast off Manitowoc.

JULY.

1.—Schooner Lone Star lost jib-boom in Welland Canal.
Tug McClellan broke her crank-pin on Lake Saint Clair.
Schooners Sea Gull and Mary Merritt badly damaged by collision in Welland Canal.
Joseph Conway drowned from bark Maggie McRae, in Welland Canal.
2.—Propeller Norman damaged by fire at Chicago to the extent of $2,500.
Schooner Two Brothers and steam-barge Leland damaged by collision at Chicago.
3.—Schooners Ellingwood and J. C. King damaged by collision at Chicago.
Scow Butcher Boy lost her small boat by collision in Detroit River.

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Schooner B. W. Folger ran on middle ground near Northport, Bay of Quitle, and sank.
Schooner Ardent sprang a leak off Milwaukee.
A sailor drowned from schooner White Oak.

4.—Schooner Wave run into by schooner Southwest in Welland Canal. Damage amounted to $500.
Schooner Lillie Parsons struck a rock in Welland Canal, and was obliged to return to Buffalo.
Propeller India ran aground at foot of Stag Island; released after twenty-four hours' delay.
Bark S. V. R. Watson run down by steam-barge W. H. Barnum on Lake Erie; sunk in 35 feet of water.
Four persons drowned by capsizing of yacht off Buffalo: John Langley and William Forest of schooner Annie Vought, and Mary Kurts and Lizzie Glass of Buffalo.
Propeller America arrived at Saint Catherine's leaking.
Tug Oswego damaged by collision on Saint Clair Flats.
Schooner Rainbow arrived at Chicago leaking.

6.—Steamer Corinthian struck upon Split Rock, Lachine Rapids, and sank; steamer Osprey sank in Saint Lawrence River at same time; the effects of a hurricane.

7.—Schooner Louise carried away gate in Welland Canal, and ran into schooner M. C. Upper; schooner Upper will prove a total loss.
Schooner William Grandy lost mizzenmast and some canvas on Lake Huron.
Schooner Kate Lyons had her mainmast shattered by lightning on Lake Michigan.
Tug Margaret badly damaged by collision with Tug Parsons at Manistee.
Schooner Norway capsized on Lake Huron; crew saved.
Schooner China damaged her rudder and sprang a leak on Lake Ontario.
Steamer Chief-Justice Waite ran aground at Toledo.
Bark Great West and schooners Imperial, Pauline, Ida Keith, and J. R. Bentley, damaged by collision at Chicago.
Steamer Stranger ran ashore near Sea Breeze house, Lake Ontario.
Schooner Eliza Fisher dismasted on Lake Ontario.
Bark John Breden sprang foremasts in the Straits.
Propeller City of New York broke her wheel near Detroit.
Steam-barge Tecumseh broke foretopmast in a storm on Lake Erie.
Propeller Prussia damaged to extent of $200 by schooner Evaline Bates in Welland Canal.

8.—Jared Merrigo drowned from steam-barge Eclipse at Essexville.
Scow J. A. Sanders struck a rock at Forest Bay, Lake Huron, and arrived at Detroit in a sinking condition.
Tug James Amadeus damaged by collision with schooner Watts Sherman at Cleveland.
Schooners Augusta and G. M. Neelon damaged by collision near Port Colborne.

9.—Tug Queen City ran down a scow at Buffalo; Joshua Sheldon and his wife and child drowned.
A deck-hand named Smith drowned from steamer Keweenaw at Detroit.
Propeller Bertschy broke cross-head off Manistee.

10.—Schooner R. B. King struck dock and drove fluke of anchor into her hull at Milwaukee.
Propeller Mary Robertson damaged machinery at Detroit.

12.—Propeller Sun sprang a leak and foundered off Rond Eau, Lake Erie; total loss.
Alexander Pecan, sailor on barge Energy, drowned at La Chine Canal.
Propeller E. B. Ward, jr., ran ashore at Northport, Lake Michigan.
Propeller Roanoke disabled machinery on Lake Erie in a storm.
Propeller Pacific and two vessels grounded on Saint Clair Flats.
Propeller Missouri ran into schooner E. P. Ryerse, lying at anchor near Long Point.

13.—Scow Chapin lost jib-boom by collision with schooner Tomine at Chicago.
Ferry steamer Boquet sank at her dock at Toronto.
John Shepard, fireman on steamer Union, killed at Oconto, by being crushed against dock.
Scow Iosco ran ashore at Port Austin Reef, Lake Huron; 280 tons plaster jettisoned.
Schooner E. M. Blake sprang a leak on Lake Erie in a storm, and threw ten tons freight overboard.

15.—Schooner Maggie McRae broke her centre-board near Port Colborne.
Schooner M. L. Higgie broke centre-board on Lake Ontario.

16.—Schooner G. M. Filer lost jib-boom by colliding with bridge at Chicago.
Patrick Tracy drowned at Oconto.
Schooner Harvest Home aground in Waiska Bay, Lake Superior.
Bark Gibraltar lost foretop-gallant mast on Lake Huron.

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Schooner Pilgrim dragged ashore at Antrim City, Traverse Bay, lies in 5 feet water.
Schooner Curlew beached in Traverse Bay.
Bark L. C. Woodruff lost jib-boom in Straits.
Schooners Anna Maria and Topsey lost jib-booms in Lake Michigan.
Schooner A. Cohn ran aground in Detroit River.

18.—Scow Lily Gary ran on beach at Michigan City, and went to pieces.
Propeller Roanoke damaged by collision with propeller Norman at Chicago.
Steamer Dove ran aground on Stony Island, Detroit River.

20.—A sailor on schooner J. I. Case, killed by falling into hold of schooner at Buffalo.

21.—Scow Planet sprang a leak on Lake Michigan.
Tug Favorite damaged by fire to extent of $200 on Lake Erie.
Schooner Australia sprang a leak on Lake Michigan.
Schooner Hubbard sprang a leak near Oswego.
Steam-barge Sparta ran aground on Saint George's Flats, Saint Mary's River.
Walter Payne, son of engineer of steamer Inter-Ocean, drowned from steamer near Detroit.

22.—Schooner Richard Mott damaged by colliding with bridge at Milwaukee.
Steamer Magnet broke her walking-beam and cylinder, off Clayton.
Schooner M. L. Breck ran aground on Fighting Island, Detroit River.

24.—Schooner Arcturus lost jib-boom off Kewaunee.
Thomas Boggs, sailor, drowned at Buffalo.
Propeller Merchant ashore on South Point, near Milwaukee.

25.—Schooner Pauline lost jib-boom by collision at Chicago.
Propeller Lowell and tug Gladiator damaged by collision at Port Huron.
Schooner Eliza Gerlach, laden with steel rails, struck by lightning on Saint Clair Flats.
Propeller City of Duluth ran aground in a squall on Hurson's Island, Detroit River.

26.—Tug Ransom sunk in Detroit River by collision with tug Urania while racing for a tow.
Schooner A. L. Lyon and barge Arizona damaged by collision off Lexington, Lake Huron.
Scow Supply arrived at Milwaukee leaking.
Schooners Mary Collins, Winona, and Comet, and the brig Mechanic damaged by squall on Lake Michigan.
Schooner Pensaukee ran into pier at Chicago.
Bark J. C. King damaged by collision on Saint Clair Flats.
Schooner Nellie Redington torn from her moorings and damaged by a sudden rise of water at Buffalo.
Scow Hurrah Boys ran ashore at Milwaukee and went to pieces.
Brigs Commerce and Fountain City and schooners Imperial and Maggie Thompson damaged by storm on Lake Michigan.
Schooner Argo lost jib-boom by collision with schooner M. A. Scott off Chicago.
Schooner Gerritt Smith had her foretop-mast carried away by squall on Lake Ontario.
Schooners Higgie and Jones and Unadilla lost canvas by squall on Lake Michigan.
Scow Maria capsized off Lexington, Lake Huron, and drifted ashore.
Propeller Dromedary sprang a leak on Lake Ontario.

27.—Schooner John M. Hutchinson grounded on Saint Clair Flats and damaged her steering-gear.
Oscar Turner drowned from propeller Scotia at Detroit.
Tug J. F. Behn exploded her boiler at Buffalo; a total loss.
A sailor on barge Racine drowned off Sand Beach, Lake Huron.
Michael McMahon, sailor on bark Gibraltar, drowned at Kingston.
Schooner Exile struck on reef at Calumet, Lake Michigan, and sprang a leak.
Schooner Seaton damaged by collision at Chicago.
Scow Butts ran on harbor-pier at Chicago, was towed up the North Branch, and became water-logged.

28.—Steamer Island Queen broke her cross-head near Malden; towed to port.

29.—Tug Little Giant damaged by collision at Chicago.
Propeller Mohawk, tug Favorite, and schooner John S. Miner damaged by collision at Detroit.
Barge M. R. Warner aground on Grassy Island, Detroit River.
Schooner Chicago Board of Trade sprang a leak and sank near Fairport, Lake Erie, in 13 fathoms of water.

30.—Scow William Bates lost foresail, &c., in storm off Racine.
Steam-barge B. W. Jenness broke machinery on Lake Erie and was towed to Detroit.
Schooner Wm. Hunter sprang a leak and sank in 13 feet of water at Dunkirk.

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AUGUST.

2.—Barge Oneida lost deck-load of wood and became water-logged on Lake Michigan.
Henry Evans, sailor on schooner Australia, killed by being thrown upon anchor by tow-line at Muskegon.
Tug Neshoto collided with schooner Silver Cloud at Two Rivers and lost her smoke-stack.
3.—Bark John Breden lost foretop-gallant mast on Lake Michigan.
Schooner William Sturgis damaged by collision with propeller Norman at Chicago.
Schooner Ironside sprang a leak on Lake Erie.
Schooner Cecilia Jeffrey ran ashore at Painesville, Ohio.
Barge City of Port Huron ran afoul of scow St. Charles in Saint Clair River.
4.—Schooner Mystic lost bowsprit and jib-boom by collision with propeller C. J. Kershaw at Chicago.
Schooner C. N. Johnson arrived at Chicago leaking badly.
Schooners Great West and Little Belle lost jib-booms by collision at Chicago.
Tugman Earnest Fesing drowned in Torch Lake, Lake Superior.
Schooner Queen of the Lakes arrived at Chicago leaking.
6.—Barge Golden Harvest damaged by collision with schooner J. C. Harrison at Chicago.
7.—Schooner Maid of the Mist dismasted off Huron, Ohio.
Steamer Fawn burst her boiler at Port Fortune, Ontario; loss $3,000; engineer badly scalded.
Steamer Warrington damaged by collision with a raft on Lake St. Clair.
8.—Charles Williams, sailor on barge Norway, drowned at Buffalo.
Steamer Kewenaw, ashore near Delour, Lake Huron.
10.—Steamer Mystic ran aground in Detroit River.
Tug Union broke her shoe at Chicago.
Schooner Lewis Wells struck by squall and lost her jib; afterward ran on pier at Buffalo and stove a hole in her bottom.
Steamer Gazelle broke machinery near Detroit.
Edward McNamara, of steam-barge Clinton, drowned at Port Dalhousie.
11.—Bark Erastus Corning aground at Buffalo.
13.—Albert Green of propeller City of Duluth, drowned at Duluth.
Steamer Thomas L. Parsons sunk in Welland Canal near Thorold.
Schooner Bessie Bolt damaged by collision at Chicago.
Steam-barge Bay City disabled and returned to Cleveland.
Steam-barge Thames burned down to hull at Lambton, Ontario.
Sailor on barge Venice killed at Toledo by a fall from the mast.
Schooner R. P. Mason aground at Sheboygan.
Propeller Clinton ran into schooner Willard at Toledo.
14.—Schooner Mary Amelia arrived at Port Colborne leaking.
Propeller City of New York broke her wheel in Welland Canal; towed to Cleveland.
15.—Barge Wyoming ashore at Sandusky.
16.—Schooner King Sisters ran ashore near False Presque Isle, Lake Huron; jettisoned 100 tons pig-iron and got off.
17.—Tug Margaret damaged by collision with tug Osgood at Manistee; loss $1,500.
Wm. Kelley, sailor on steamer W. L. Wetmore, drowned near Point au Pellee.
18.—Schooner Senator Blood ashore at Bay Point, Lake Erie; released with little injury.
19.—Schooners C. A. King and E. G. Gray lost jib-booms by collision at Chicago.
Schooner C. J. Wells arrived at Buffalo with a broken bowsprit.
Schooner W. S. Crossthwaite ashore at Point Albino, twelve miles from Buffalo; released.
Steamship W. T. Graves sprang a leak on Lake Michigan.
Sailor on steamer St. Lawrence drowned at Indian Cove.
Propeller Ontario arrived at Detroit with a broken wheel.
20.—Schooner Alvira Cobb sprang a leak at Chicago.
Bark S. V. R. Watson, after being pulled off from Point au Pellee, leaked so badly that she was beached at Port Burwell, Lake Erie, and now lies full of water.
Capt. John Morrison, of schooner Eva, struck by lightning off Manitowoc and remained senseless for three hours. Next day he was knocked overboard and drowned by jibbing of main boom.
Schooner Union ashore near Port Colborne; released with slight injury.
Ferry-steamer Stillman Witt sprang a leak and sunk at Deluth; in water up to her guards.
21.—Schooner L. J. Farwell ran ashore in Detroit River.
Steamer City of London destroyed by fire at Collin's Inlet, Georgian Bay; deckhand named Campbell burned to death.
Barge Advance and schooners J. G. Masten and City of the Straits damaged by lightning at Chicago.

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22.—Schooner Raleigh lost foretop-mast on Lake Michigan.
Propeller Shickluna lost foretop-mast by collision with schooner Typho at Milwaukee.
Schooner Wm. Sanderson struck by a squall and sprang a leak, and was beached at White Rock.
A convict named Kane jumped overboard from a propeller at Algonac and was drowned.
Scow Shaw struck old pier off Fairport, Ohio, and went to pieces.
24.—Steamer City of Toledo burned at Manistee; all inside work burned; loss $10,000.
Tug Annie M. Pierce broke wheel on Lake Huron.
Schooner Evelyn had her bulwarks stove in and anchor carried away by schooner Monitor, at Two Rivers.
Schooner C. H. Walker passed Detroit minus foretop-mast.
Schooner Butcher Boy sprang a leak on Lake Erie; towed to Cleveland.
Tug J. L. Higgie sunk in Mud Lake, near Chicago.
25.—Scow Industry wrecked off Black River, Lake Erie; a total loss.
Barge Chester B. Jones returned to Chicago leaking.
A deck-hand on tug McClellan drowned at Chicago.
Schooner John T. Mott sprang a leak in the Straits and was towed to Detroit.
Deck-hand named Sutherland drowned from steamer Watertown in Saint Lawrence River.
Propeller Music broke her shaft on Lake Michigan; towed to Traverse City.
27.—Steam-barge S. C. Baldwin sprang a leak during storm on Lake Michigan; arrived at Milwaukee with water running into hold at the rate of 14 inches per hour.
Schooner Dashing Wave lost jib-boom by collision with bark Erastus Corning, at Chicago.
Barge F. X. arrived at Bay City leaking badly.
Lewis S. Blondheim drowned from schooner Augusta on Lake Ontario.
Schooner M. I. Wilcox sprang a leak in the Straits.
Steam-barge D. W. Rust aground on Saint Clair Flats.
Schooner Mowry lost bowsprit and jib-boom by collision with schooner Nevada off Grand Haven.
Schooner H. C. Post ran ashore at Two Rivers; released.
Schooner Elvina ashore on North Harbor Reef, Lake Ontario.
28.—Steamer Antelope sprang a leak off Oswego.
Steamer Wave destroyed by fire off the Charities, Saginaw Bay.
Schooner Harrison sprang a leak on Lake Michigan.
Propeller Cuba ran into schooner Franklin and carried away schooner's rail and stanchions.
29.—Schooner J. H. Hazard damaged by colliding with a bridge at Toledo.
30.—Steamship Ketcham and schooner Belle Walbridge collided off Waukegan. Ketcham put into Racine leaking, and schooner returned to Chicago minus foremast, &c.
31.—Schooner Bertha Barnes damaged by colliding with a bridge at Toledo.
Schooners Lumberman, Milwaukee Belle, and H. C. Hegg, damaged by collision at Chicago.
Tug Dexter damaged by collision with schooner M. L. Collins at Milwaukee.
Schooner Argo sprang a leak and water-logged off Kewaunee, Lake Michigan.

RECAPITULATION.

Casualties.	January.	February.	March.	April.	May.	June.	July.	August.	Total.
Sunk	....	1	....	4	2	6	16	7	36
Damaged, disabled, &c	3	6	9	12	26	23	29	12	102
Ashore and aground	1	1	....	16	31	14	22	14	99
Sprang a leak	....	....	1	24	16	10	11	15	55
Damaged by collision	....	1	3	24	42	30	38	27	165
Damaged by fire	....	1	....	3	3	3	2	2	13
Destroyed by fire	....	1	....	....	....	....	....	2	3
Water-logged	....	....	....	2	2	....	1	1	6
Struck by lightning	....	....	....	....	....	1	2	3	6
Dismasted	....	....	....	....	....	....	....	....	.....
Exploded boiler	....	....	....	....	1	1	....	1	3
Drowned	....	....	....	10	3	5	17	11	46
Killed by accident	1	....	....	....	10	13	2	2	28
	1	....	....	10	13	18	19	13	74

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PAPER 58.

List of Boards of Trade, Chambers of Commerce, and other organizations, apart from those directly connected with agriculture, which had on September 30, 1874, appointed permanent committees to confer with the Chief Signal-Officer of the Army.

Name of organization.	State.	Committee.
Chamber of Commerce of New York	New York	George W. Dow, M. Maury, J. D Jones, Charles G. Curtis.
Board of Trade of Buffalo	....do	Alonzo Richmond, George S. Hazard, John H. Vaught.
Board of Underwriters of New York	....do	John D. Jones, Daniel Drake Smith, Elwood Walter, Alfred Ogden.
Board of Trade of Toledo	Ohio	W. T. Walker, M. D. Carrington, A. W. Colton, C. A. King.
Board of Trade of Washington	District of Columbia	J. W. Thompson, A. S. Solomons, R. M. Hall.
Board of Trade of Detroit	Michigan	J. Aspinwall, G. W. Bissell, E. W. Hudson.
Board of Trade of Chicago	Illinois	C. Randolph, D. H. Denton, E. T. Lawrence.
Board of Trade of Boston	Massachusetts	Nathaniel Spooner, Thomas Gaffield, Eben Howes.
Chamber of Commerce of Milwaukee	Wisconsin	John L. Hathaway, J. B. Merrill, L. R. Durand.
Board of Trade of Nashville	Tennessee	James Whitworth, R. T. Kirkpatrick, Dr. W. W. Berry, E. D. Hicks, M. S. Cochrill.
Chamber of Commerce of Duluth	Minnesota	Charles M. Cushman.
Board of Trade of Baltimore	Maryland	H. L. Whitridge, Robert R. Kirkland, Benjamin M. Hodges, jr., J. Hall Pleasants
Board of Trade of New London	Connecticut	James T. Skinner, George P. Rogers.
Board of Trade of San Francisco	California	R. R. Swain, J. De Freney, R. G. Sneath, C. A. Low.
Board of Trade of Cleveland	Ohio	R. K. Winslow, R. F. Lyon, J. C. Sage.
Chamber of Commerce of Charleston	South Carolina	E. H. Frost, W. P. Hall, T. W. Dawson.
Board of Trade of Charleston	....do	Hon. George A. Trenholm, Prof. F. S. Holme, E. Lafitte.
Chamber of Commerce of Memphis	Tennessee	B. J. Semmes, H. H. Higbee, Thomas H. Allen.
Board of Trade of Oswego	New York	A. H. Failing, W. J. Malcolm.
Board of Trade of Omaha	Nebraska	A. D. Jones, G. H. Collins, M. Stephens, Col. J. Patrick, C. C. Housel.
Committee appointed by mayor of Rochester.	New York	George Schofield, John Siddons, Henry S. Hebbard.
Board of Trade of Portland	Maine	C. H. Farley, J. S. Bodlow, M. N. Rich.
Board of Trade at Philadelphia	Pennsylvania	Henry Winsor, Thomas C. Hand, Thomas L. Gillespie, George N. Fotham, George N. Allen, James Hand.
Board of Trade of Mobile	Alabama	J. M. Thompson, J. Y. Thompson, Daniel Jones.
Chamber of Commerce of Savannah	Georgia	General Joseph E. Johnston, J. F. Gilmer, H. C. Wayne.
Chamber of Commerce of Wilmington	North Carolina	A. H. Van Bokkelen, George Harriss, W. L. De Rossett.
Board of Trade of Norfolk	Virginia	Dr. S. K. Jackson, W. A. Graves, E. C. Lindsay.
Board of Trade of Indianapolis	Indiana	D. M. Berry, E. F. Cox, John E. Wright, W. R. Nofsinger, S. T. Bowen.
Chamber of Commerce of Saint Paul	Minnesota	R. Ormsby Sweeney, Rev. J. Mattocks, J. Fletcher Williams.
Board of Trade of Burlington	Vermont	G. G. Benedict, Prof. Peter Collier, Prof. McK. Petty.
Union Merchants' Exchange of Saint Louis.	Missouri	George P. Plant, R. P. Taney, W. H. Scudder.
Chamber of Commerce of Galveston	Texas	J. S. Thrasher, W. Richardson, C. G. Forshey.
Board of Trade of Shreveport	Louisiana	George Williamson, R. D. Sale, George A. Pike.
Chamber of Commerce of San Diego	California	Douglass Gunn, C. A. Jones, J. S. Gordon.
Philadelphia County Medical Society	Pennsylvania	Lawrence Turnbull.
Board of Trade of Davenport	Iowa	James M. Dalzell, Edward Russell, F. A. Angel.
Board of Trade of Jacksonville	Florida	A. S. Baldwin.
Chamber of Commerce of Indianola	Texas	G. Secligson, W. P. Milby, D. Sullivan.
Board of Trade of La Crosse	Wisconsin	William W. Jones, James J. Lyndes, S. L. Nevins.
Cotton Exchange of New Orleans	Louisiana	John J. Noble, Cyrus Bussey, Thomas Henderson.
Chamber of Commerce of New Haven	Connecticut	Johnson T. Platt, Mayor Lewis, E. S. Wheeler.

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List of boards of trade, chambers of commerce, &c.—Continued.

Name of organization.	State.	Committee.
Chamber of Commerce of Cairo	Illinois	W. P. Halliday, Charles M. Howe, Peter Cuhl.
Board of Trade of Cincinnati	Ohio	Daniel B. Pierson.
Board of Trade of Dubuque	Iowa	Dr. Asa How, Franklin Hinds, R. J. Gibbs.
Board of Trade of Albany	New York	William H. Hale, E. C. Jackson, E. T. Durant.
Board of Trade of Louisville	Kentucky	J. L. Smith, Dr. B. M. Wible, R. A. Robinson, John A. Carter, J. Val Cowling.

PAPER 59.

List of places for which stations have been requested but not established on September 30, 1874.

Place.	Applicant.	Date.
Muskegon, Mich	Hon. H. H. Holt, Michigan legislature, inclosing petition of 99 citizens.	Jan. 21, 1871
	Board of Trade of Toledo	Jan. 27, 1871
	Board of Trade of Chicago	Feb. 10, 1871
	Hon. T. W. Ferry, United States Senate	Mar. 3, 1871
Manitowoc, Wis	H. P. Sawyer, member of Congress	Jan. 25, 1871
Huron City, Mich	Board of Trade of Toledo	Jan. 27, 1871
	Board of Trade of Cleveland	Jan. 19, 1871
	Board of Trade of Detroit	Feb. 19, 1871
Mackinac, Mich	Board of Trade of Chicago	Feb. 10, 1871
Richmond, Va	W. G. Turpin	Apr. 3, 1871
Body Island, N. C	Board of Trade of Norfolk, Va., and resolution of the general assembly of Virginia.	Apr. 17, 1871
Lewes, Del	Board of Trade of Philadelphia	May 25, 1871
Parks, Colo	E. J. Mallett, late consul-general	May 24, 1871
Staten Island	C. Kentgen, jr	June 9, 1871
Chambersburgh, Pa	Hon. John Scott, United States Senate	June 12, 1871
	Hon. Simon Cameron, United States Senate	June 12, 1871
Watertown, N. Y	L. L. Pratt	June 21, 1871
Xenia, Ohio	C. E. Case	June 30, 1871
Port Hope	Board of Trade of Detroit, Mich	July 22, 1871
Illinois Industrial University, Champaign, Ill.	Hon. W. C. Flagg, secretary	July 21, 1871
	Hon. J. M. Gregory, president	Feb. 21, 1872
	E. A. Gustman, chairman meteorological committee Macon County Fruit-Growers' Association.	Aug. 30, 1874
Little Rock, Ark	Hon. J. M. Hawks, member of Congress	July 26, 1871
	Albert Cohen	July 1, 1872
	A. Van Cleff	May 31, 1873
	Hon. Powell Clayton, United States Senate	Mar. 11, 1874
Sacramento, Cal	J. N. Hoag, secretary California State Board of Agriculture.	July 26, 1871
	Concurrent resolution of the Legislature of California, presented by Dr. T. M. Logan, secretary State board of health.	May 15, 1872 Jan. 10, 1872
Niles, Mich	J. B. Fitzgerald, secretary Berrien County Agricultural Society.	July 27, 1871
Hot Springs, Ark	J. H. Morton, M. D	Aug. 2, 1871
Louisiana, Mo	William Stark and R. E. Pleasants	Aug. 3, 1871
Janesville, Wis	J. B. Whiting, M. D., and Rock County Agricultural Society.	Aug. 7, 1871
Hillsdale, Mich	Prof. George M. Miller, secretary Hillsdale College	Aug. 6, 1871
	Hillsdale County Agricultural Society	Aug. 6, 1871
Metamora, Ill	Edward Kipp, secretary Woodford County Agricultural Society.	Aug. 8, 1871
Marietta, Ohio	J. W. Andrews, president Marietta College	Aug. 10, 1871
	Washington County Agricultural Society	Aug. 10, 1871
Mount Pleasant Academy, Pa	W. H. McCrey, Mount Pleasant Academy and Normal School.	Aug. 11, 1871
Nebraska City, Neb	H. K. Raymond, secretary Otoe County Farmers' Club	Aug. 14, 1871
Mount Moosilanke, N. H	Prof. C. H. Hitchcock	Aug. 16, 1871
	A. F. Clough	Aug. 16, 1871
Catasauqua, Pa	Hon. E. McPherson, Clerk United States House of Representatives.	Sept. 11, 1871
Galena, Ill	Dr. Wilmot Scott, editor Galena Commercial Advertiser.	Sept. 14, 1871
Columbus, Neb	J. O. Shannon, secretary Platte County Agricultural Society.	Sept. 5, 1871
Farther Point, Coburg, and Collingwood, Canada.	Oswego Board of Trade, by J. L. McWhorter.	Aug. 30, 1871

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List of places for which stations have been requested, &c.—Continued.

Place.	Applicant.	Date.
Springfield, Mo	John E. Worth, for Greene County Agricultural and Mechanical Society.	Sept. 18, 1871
Mason City, Iowa	T. G. Emsley, Secretary Cerro Gordo County Agricultural Society.	Oct. 6, 1871
Orono, Me	M. C. Fernald, Maine State College of Agriculture	Oct. 19, 1871
Balize, La., Fort Morgan, Ala., Waco, Tex.	Agent and captains of Morgan Steamship Company	Oct. 31, 1871
Fort Randall, Dak	R. J. Percy, for Missouri Valley Telegraph Company	Nov. 9, 1871
University of Michigan, Ann Arbor.	Prof. G. B. Merriman	Nov. 28, 1871
Fort Garry, Manitoba	N. McDougall	Dec. 2, 1871
Fountain, Colo	R. F. Long, editor El Paso Ranchman	Dec. 4, 1871
Vineyard Haven, Mass	Prof. J. E. Hilgard, United States Coast Survey, Daniel W. Stevens, and Rev. Thomas Hill.	Dec. 18, 1871
Newport, R. I	Hon. H. B. Anthony, United States Senate, forwarding memorial of 29 citizens.	Dec. 8, 1871
	Capt. S. A. Day, United States Army	July 26, 1872
Cape Ann, Mass	Hon. B. F. Butler, member of Congress	Dec. 19, 1871
Iowa City, Iowa	John P. Irish	Dec. 14, 1871
Manassas, Va	George C. Round	Dec. 27, 1871
Quincy, Ill	A. H. Hill, Secretary National Baord of Trade	Jan. 4, 1872
Dover Point, N. H	John B. Stivens, mayor	Jan. 13, 1872
Wilmington, Del	Board of trade	Jan. 24, 1872
Additional stations on eastern shore of Lake Michigan.	Hon. H. H. Holt, Michigan legislature	Feb. 11, 1871
Additional stations on Mountains of Virginia.	G. C. Wedderburn, secretary Virginia Telegraph Company; L. A. Gobright, associated press.	May 7, 1871
Additional stations on western slope of Mississippi Valley.	George P. Plant, W. H. Scudder	May 7, 1871
Southwest Pass, Pass à l'Outre	R. P. Handey, committee of Merchants' Exchange, Saint Louis, Mo.	July 16, 1871
Stanton, Va.; Christianburgh, Va.; Bristol, Tenn.; Easton, Pa.; Harrisburgh, Pa.; Winchester, Va.	Thornton A. Jenkins, rear-admiral United States Navy	Mar. 20, 1871
	Jed. Hotchkiss	Aug. 15, 1871
Towanda, Kans	M. D. Ellis	Feb. 12, 1872
Black Dome, Black Mountain, N. C.	William Cain	Feb. 12, 1872
Charlotte, N. Y	J. Eaton and thirty-five others	Feb. 14, 1872
Gallitzin, Altoona on Pennsylvania Central Railroad.	David Peelor	Feb. 17, 1872
University of Minnesota, Minneapolis.	William Folwell, president	Feb. 21, 1872
Each of the State Agricultural Colleges.	J. B. Bowman, regent Kentucky University, and others	Feb. 29, 1872
Columbus, Ohio	J. H. Klippart, secretary of Ohio State Board of Agriculture.	Mar. 5, 1872
Norwich University, Northfield, Vt.	Capt. C. A. Curtis	Mar. 15, 1872
Grand Tower, Ill	A. R. Harris	Mar. 21, 1872
Iuka, Miss	Rev. J. T. Freeman, through Hon. George E. Harris, member of Congress.	Mar. 25, 1872
Great Natihalee, Bald Mountain, N. C.	Charles W. Jenks	Apr. 1, 1872
Deposit, N. Y	G. W. Hanford	Apr. 1, 1872
Heilman Dale	S. P. Heilman	Apr. 1, 1872
Boonville, Mo	J. L. Stephens	Apr. 11, 1872
Fort Wayne, Ind.; New Albany, Ind.	F. C. Johnson, Indiana State Board of Agriculture	Apr. 12, 1872
Maryland Agricultural College	A. R. Davis, president board of trustees	Apr. 19, 1872
San Antonio, Tex	Thomas G. Williams	May 10, 1872
	Tred. Petterson, and 52 others	Mar. 16, 1874
	Hon. M. C. Hamilton, United States Senator	Mar. 17, 1874
	Hon. John Hancock, member of Congress	Apr. 1, 1874
Atlanta, Ga	Hon. John H. James, mayor	May. 10, 1872
	R. W. Whiteley	Feb. 15, 1874
Auburn, Ala.; Agricultural and Mechanical College of Alabama.	William C. Stubbs, John B. Reed, W. H. Jenison	May 14, 1872
Racine, Wis	Mayor and Council	May 18, 1872
Ogdensburgh, N. Y	Hon. W. A. Wheeler, member of Congress	May 25, 1872
Plattsburgh, N. Y	Hon. John Rogers, member of Congress	May 28, 1872
Sewanee, Tenn	John L. Cooper, through Prof. Joseph Henry, Smithsonian Institution.	June 10, 1872
Newark College, Del	William D. Mackey, secretary	June 11, 1872
Green Bay, Wis	Hon. P. Sawyer, member of Congress	June 13, 1872
	Philetus Sawyer, member of Congress	June 24, 1874
Kenosha, Wis	Wallace Mygatt	June 20, 1872
Warsaw, Ind	Marshall H. Parks	June 24, 1872
Beaver City, Utah	Daniel Tyler	July 8, 1872
New Ulm, Minn	Dr. Alfred Miller	July 10, 1872

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List of places for which stations have been requested, &c.—Continued.

Place.	Applicant.	Date.
Evansville, Ind	F. C. Johnson; P. Hornbrook, surveyor of customs; Thomas P. Britton, president Vanderburgh County Agricultural Society.	July 13, 1872
	John Ingle, secretary Vanderburgh County Agricultural Society.	July 13, 1872
	Charles Butterfield, mayor	July 13, 1872
	C. H. Butterfield, mayor	Nov. 26, 1873
	H. L. Morrill, citizens of Evansville	Jan. 16, 1874
Aiken, S. C	Hon. F. A. Sawyer, United States Senate, and 16 citizens	July 16, 1872
	John C. Derby	Sept. 2, 1872
Winona, Miss	A. M. Rafter	July 20, 1872
Eutaw, Ala	W. S. Bird	July 20, 1872
Belfast, Me	George E. Brackett	Aug. 6, 1872
Ithaca, N. Y., Cornell University	A. D. White, president, petition of 75 citizens	Aug. 8, 1872
Straits of Mackinac	Roys I. Cram	Aug. 7, 1872
	Board of Trade of Buffalo	May 26, 1873
	Board of Trade of Chicago	May 22, 1873
	J. L. Hathaway, J. B. Merrill, Meteorological Chamber of Commerce, Milwaukee	Sept. 5, 1874
Carthage, Ill	L. F. M. Easterday, petition of 105 citizens	Sept. 2, 1872
Kutztown, Pa	A. R. Hornel, principal of Keystone State normal school	Sept. 13, 1872
Pensacola, Fla	Pensacola Ice Company, M. H. Sullivan, and 29 others	Oct. 7, 1872
Gainesville, Ga	M. F. Stephenson	Nov. 5, 1872
	D. L. Yulee	Feb. 7, 1874
Chattanooga and some point between Leavenworth and Shreveport.	Steamboatmen's convention assembled at Cairo	Nov. 17, 1872
Dallas, Tex	W. A. Jones & Co., W. C. Connor, and 133 others	Dec. 26, 1872
On plains of Western Kansas and regions southward and southwestward.	Kansas State Horticultural Society	Dec. 21, 1872
Oil City and Parker's Landing, on the Allegheny River. Greensborough and Brownsville, on the Monongahela.	Resolution of select council of Pittsburgh, transmitting and approving petition of forty-six citizens of Pittsburgh	Dec. 28, 1872 Jan. 10, 1873
University of Kansas, Lawrence.	John Fraser, chancellor	Jan. 16, 1873
Manchester, N. H	Hon. S. N. Bell, member of Congress, inclosing resolution of New Hampshire State Agricultural Society.	Jan 21, 1873
Sandwich, Ill	M. E. Ballou, through Commissioner of Agriculture	Jan. 22, 1873
Detroit, Minn	Daniel Couey	Feb. 2, 1873
Dayton, Ohio	Isaac Strohm	Feb. 11, 1873
Pilatka, Fla	J. F. Starr, through Secretary of the Navy	Feb. 17, 1873
Put-in-Bay, Ohio	H. B. West	Mar. 3, 1873
	H. D. Cooke, governor of the District of Columbia	July 17, 1873
Emporia, Kans	Robert Milliken	Mar. 6, 1873
North and west of Galveston, Texas.	Chamber of Commerce, through John Hancock	Mar. 6, 1873
Charlotteville, Va.; University of Virginia.	R. T. W. Duke, member of Congress	Mar. 2, 1873
Raleigh, N. C	Cotton Exchange, New Orleans, La	Mar. 30, 1873
Columbia, S. C	Mayor of city and city council	June 11, 1873
Columbus, Miss	Cotton Exchange, New Orleans, La	Mar. 20, 1873
Pierce City, Mo	E. P. Lingee	Apr. 9, 1873
Nashanic, N. J	John V. D. Punyea	Apr. 12, 1873
	N. B. Bradley, member of Congress	Apr. 27, 1873
Bay City, Mich	N. B. Bradley, member of Congress	Feb. 19, 1874
	N. B. Bradley, member of Congress	June 17, 1874
Vincennes, Ind	W. Hays	June 15, 1873
Springfield, Ill	S. M. Cullom, petition of governor, State officers, &c.	July 5, 1873
	E. A. Gustman, chairman meteorological committee Macon County Fruit-Growers' Association	Aug. 30, 1874
Cedar Keys	Abert E. Willard, mayor, and sixteen others	July 7, 1873
	D. L. Yulee, Ferdinanda, Fla	Feb. 7, 1874
Salina, Kans	Treeman Kingman	July 17, 1873
Alleghanies	George W. Warren, jr	July 26, 1873
Carthage, Mo	E. P. Searle, Henry C. Henney, C. C. Allen, and others	Aug. 15, 1873
New Berne, N. C	George W. Nason, jr	Sept. 13, 1873
Port Townsend, Washington Territory.	Puget Sound Telegraph	Sept. 30, 1873
Mineral Point, Wis	Hon. T. O. Howe, U. S. Senator; Moses M. Strong	Dec. 16, 1873
Latitude 40° 30′, longitude 74° 42′; Somerset, N. J.	Hon. F. T. Frelinghuysen; citizens of Somerset, Hunterdon and Middlesex Counties.	Dec. 22, 1873
Carlton, Kewannee County, Wis	Edward Bach; farmers and shipowners of the district	Jan. 10, 1874 Jan. 15, 1874
Ferdinanda, Fla	Henry Hazen, collector; W. S. Simmons, 1st lieut. U. S. R. M.; D. C. Conover, U. S. Senator; G. Stark, mayor; Isaiah Wind, president of council, and twenty-two others	Jan. 17, 1874 Jan. 19, 1874
	D. L. Yulee	Feb. 7, 1874
University of California	J. West Martin, secretary board of regents	Feb. 12, 1874

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List of places for which stations have been requested, &c.—Continued.

Place.	Applicant.	Date.
Helena, Ark	J. L. Alcorn, United States Senator	Feb. 12, 1874
Fayetteville, Ark	Hon. A. S. Prather, trustee Arkansas Industrial University, Huntsville, Ark.	Feb. 17, 1874
Manhattan State Agricultural College.	John J. Ingalls, R. Crozier, W. A. Phillips, and D. P. Lowe.	Feb. 18, 1874
Beatrice, Gage County, Neb	P. W. Hitchcock, United States Senate; A. S. Paddock	Mar. 3, 1874
One or more stations in Arizona	Charles Denison, M. D	Mar. 16, 1874
Manistee, Mich	Hon. J. A. Hubbell, United States Senator; G. T. Estis	Mar. 18, 1874
Fort Macon, N. C	J. M. Leach, M. C	Mar. 28, 1874
Gorham, N. H	Elias S. Mason	Mar. 30, 1874
Mason City, Mason County, Mo.	J. F. Benjamin, Brown & Shepard, E. B. Van Vent, and thirty-three others.	Mar. 30, 1874
Rockland, Me	Citizens of Rockland, Belfast, &c., Me.; E. Waite, and twenty-seven others.	Apr. 9, 1874
Rome, Ga	Thomas J. Perry	Apr. 24, 1874
Kansas City, Mo	Theo. S. Case, postmaster	May 1, 1874
Muscatine, Iowa	J. P. Walton	May 7, 1874
Syracuse, N. Y	M. Graves, mayor, Wm. Kirkpatrick, J. R. Whittock, and J. Hill.	May 9, 1874
	Additional application of Hon. R. H. Duell	May 11, 1874
Bakersfield, Kern County, Cal	A. C. Bratton, M. D.; P. D. McClanahon, M. D	May 14, 1874
Palmyra, Wis	J. C. Minton	May 19, 1874
Crawfordsville, Ind	H. B. Carrington, col. U. S. A., chair of military science, Wabash College.	June 6, 1874
Harbor of Refuge, Sand Beach, Lake Huron.	Maj. G. Weitzel, Corps of Engineers	June 11, 1874
Calais, Me	Hon. Eugene Hale and Boardman Brothers	June 16, 1874
Fort Thompson	Col. D. S. Stanley	June 18, 1874
Chatawa, Pike County, Miss	Alexander W. Gordon, College of the Redemptionist Fathers.	July 13, 1874
Ellsworth, Kans	W. A Phillips, M. C	July 14, 1874
	M. W. Henry	July 21, 1874
Mount Lake, Giles County, or Bald Knob, W. Va.	Mrs. H. Haupt	July 21, 1874
Camden, N. J	Wood Dialogue & Co	July 29, 1874
Bloomington, Ill	E. A Gustman, meteorological committee Macon County Fruit-Growers' Association.	Aug. 30, 1874
Decatur, Ill	E. A. Gustman, meteorological committee Macon County Fruit-Growers' Association.	Aug. 30, 1874

PAPER 60.

Names, &c., of vessels from which logs have been received during year ending September 30, 1874.

Names of vessels.	Kind.	Total number logs received.	Kind of blanks used.	Names of vessels.	Kind.	Total number logs received.	Kind of blanks used.
Bessy Parker	Bark	1		Oceanic and Republic	Steamship	4	
Montgomery Castle	Ship	1		Hammonia	do	1	
Monmouthshire	do	1		City of London	do	1	
San Jacinto	Steamer	2	Office blank.	Lottie Stewart	do	1	
Noord Braband	Ship	1		City of Montreal	do	1	
Andromeda	do	1		Unknown	do	1	
Calabria	Steamship	1		Sidonian	do	1	
Prussian	do	1	Office blank.	Periere	Steamer	1	
Russia	Steamer	2	Do.	Sunshine	Bark	1	
Caspian	Steamship	2	Do.	Egypt	Steamship	1	
Nabob	Bark	1		Maury	Bark	1	
Sarah Grice	Ship	1		City of Brussels	Steamship	2	
Abyssinia	Steamer	1		Republic	do	3	
Italy	Steamship	1		America	do	1	Office blank.
Berlin	do	13	Office blank.	Westphalia	do	1	
City of Limerick	do	1		Thuringia	do	1	
Nova Scotian	do	1	Office blank.	Fleur de Lis	Bark	1	
Gaelic	do	1		Columbia	do	1	
Scandinavian	do	1	Office blank.	Albatross	do	1	
Adriatic	do	1		Lady Lycett	Steamship	1	
J. O. Grant	Ship	1		Holland	do	1	
Grace Roberts	Bark	1		Ohio	do	1	
Hansa	Steamship	1		Pennsylvania	do	1	
Rhein	do	1					

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Names, &c., of vessels from which logs have been received, &c.—Continued.

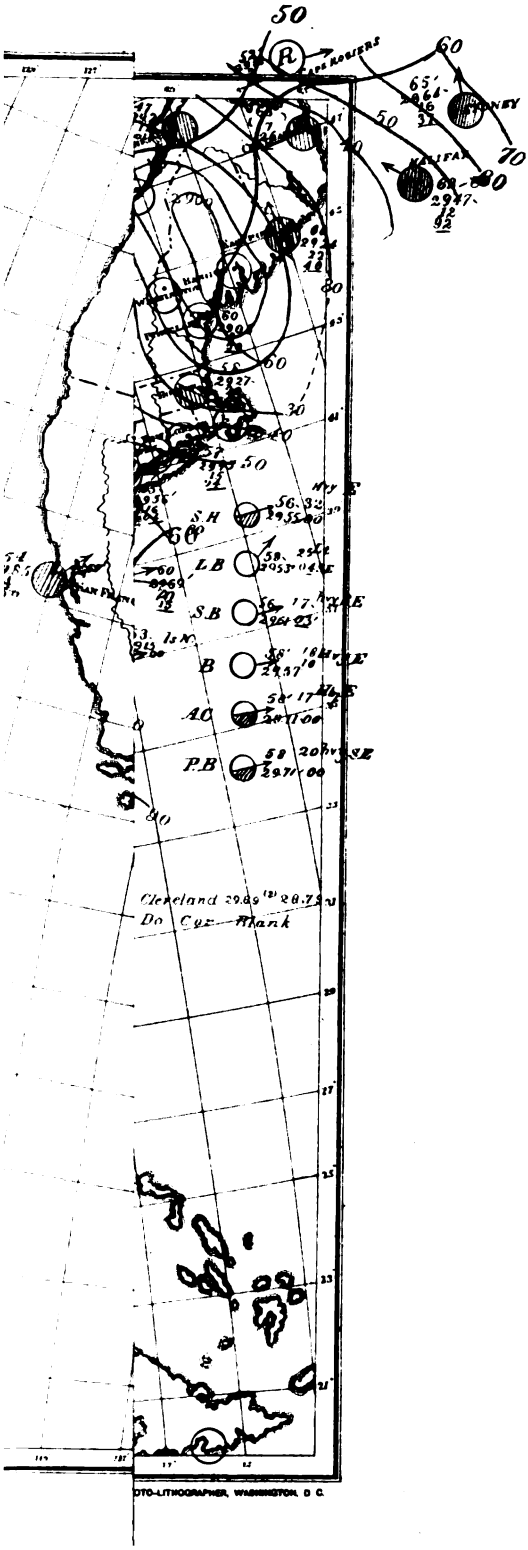
Names of vessels.	Kind.	Total number logs received.	Kind of blanks used.	Names of vessels.	Kind.	Total number logs received.	Kind of blanks used.
Europe	Steamship	1	Office blank.	Challenge	Bark	1	
Cimbria	...do	1		Black Hawk	Ship	1	
Phœnician	...do	1		A. M. Minot	...do	1	
C. T. French	...do	1		Alcatraz	...do	1	
Canada	...do	1		Gen. McClellan	...do	1	
Victoria	...do	1		Cosma	Bark	1	
Virginia	...do	1		Saranac	U. S. st'r	1	
Main	...do	1		Ocean Rover	Bark	1	
Macedonia	...do	1		Marion	Ship	1	
Donan	...do	1		Allahabad	...do	1	
Anglia	...do	1		Nerems	...do	1	
Circassian	...do	1	Office blank.	Java	Steamship	1	
Polynesian	...do	2	Do.	Moselle	...do	2	
Quorn	Ship	1		Deutchland	...do	1	
Greyhound	Schooner	1		Hibernian	Steamer	1	
Alex. Marshall	Ship	1		Arragon	Steamship	1	
C. P. D	Bark	1		Cuba	...do	1	
Maravilla	...do	1		Austria	Ship	1	
Aureola	...do	1		Fletcher	...do	1	
Loleta	Schooner	1		Bermuda Light-House		1	
Comet	Bark	1		Eden	Bark	1	
Nestorian	Steamship	1	Office blank.	Hercules	Ship	1	
McNear	Ship	1		Carrick Castle	...do	1	
Varuna	Schooner	1		Nautilus	Bark	1	Office blank.
Ocean Pearl	...do	1		Vesuvius	...do	1	
Sarah Bell	Ship	1		Ravenscrag	Ship	1	
D. C. Murray	Bark	2		Essey	...do	1	
Cormorant	Ship	1		Glencoe	...do	1	
Alden Besse	Bark	1		Thos. Brodeband	Bark	1	
Wisconsin	Steamship	1	Office blank.	Lunalilo	...do	1	
Baltimore	...do	7	Do.	Austrian	Steamer	1	Office blank.
Quickstep	Bark	1		Franklin	Steamship	1	
Brunette	...do	1		Mosel	...do	1	
Buena Vista	...do	1		New York	...do	1	
Luigi	...do	1		Golden Gate	Ship	1	
Notre Dame	Ship	1		Weser	Steamship	1	
Gentoo	...do	1		Stanley Sleath	Bark	1	
Thos. Dana	...do	1					
Geo. Groshan	Bark	1					
Wachusett	U. S. st'r	3		Total number of logs received		161	
Shenandoah	...do	4					
Alex. Duffie	Ship	1					

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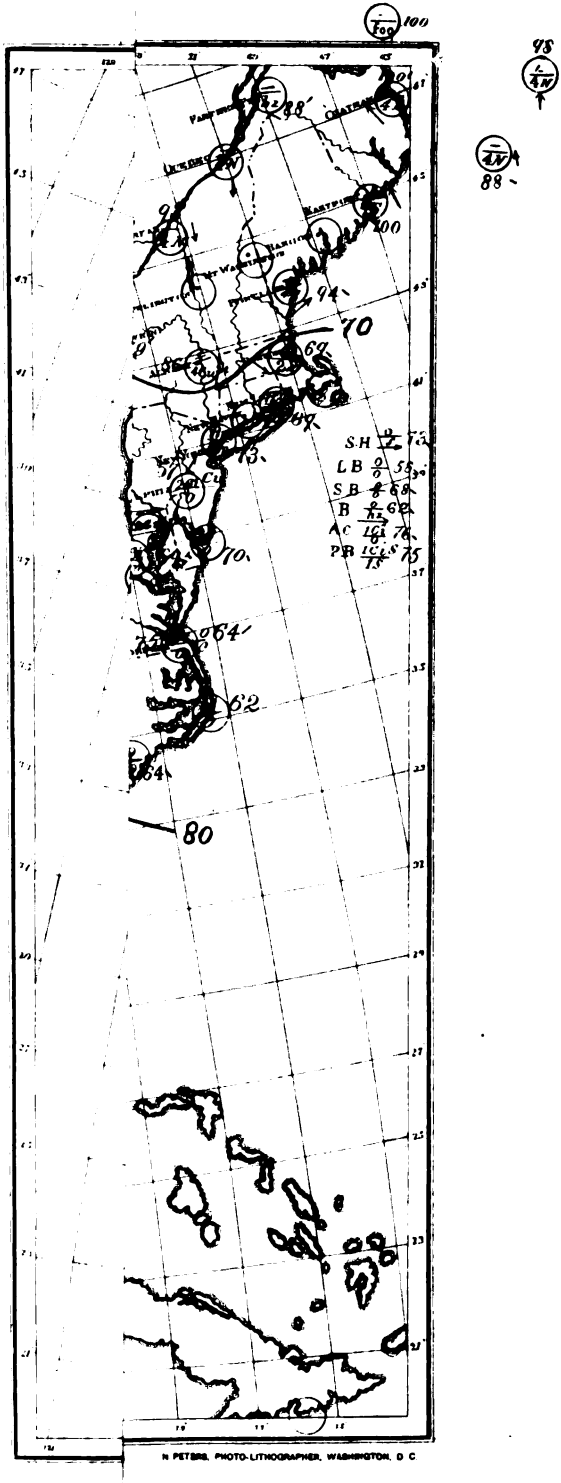
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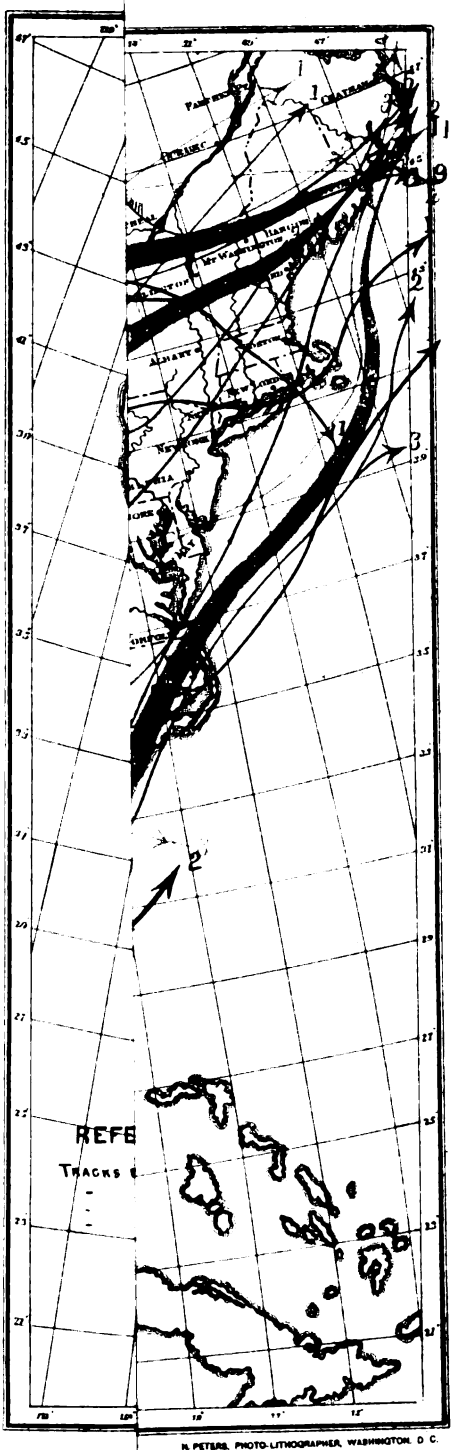
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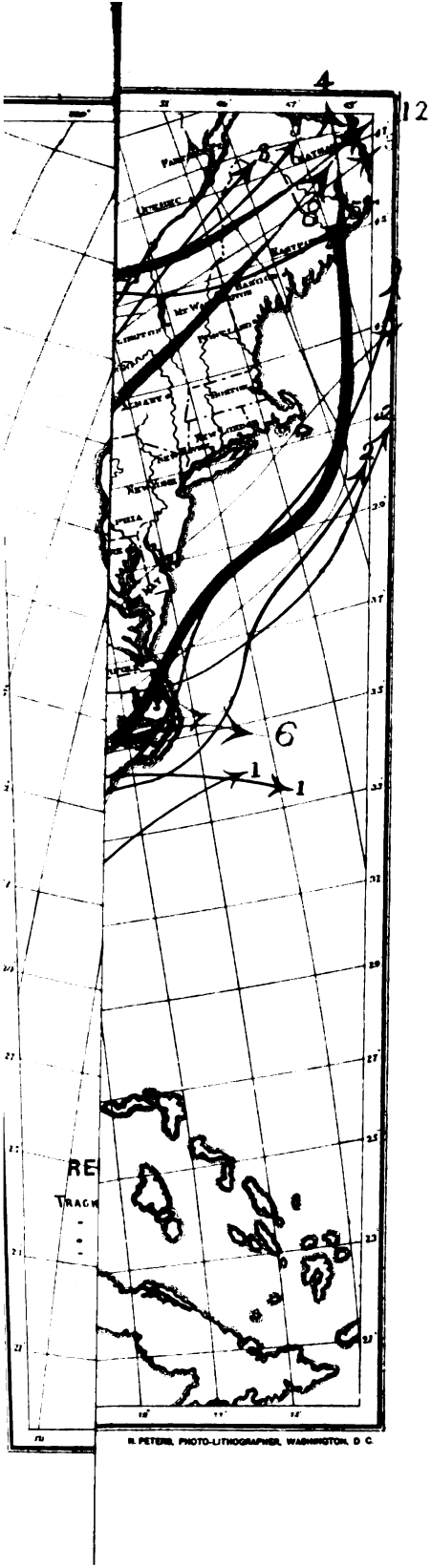
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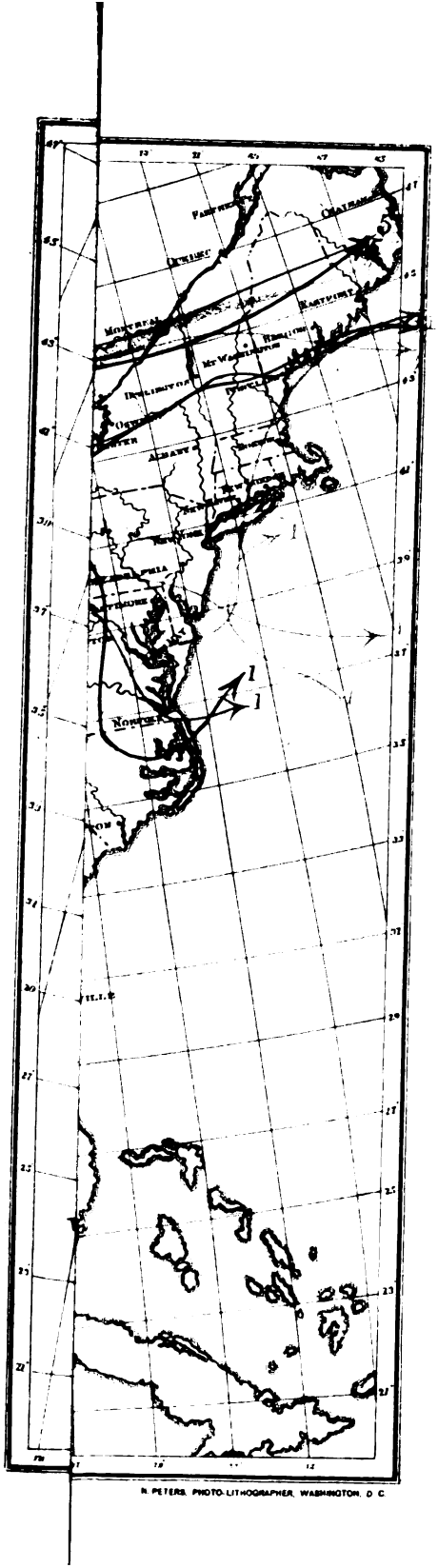
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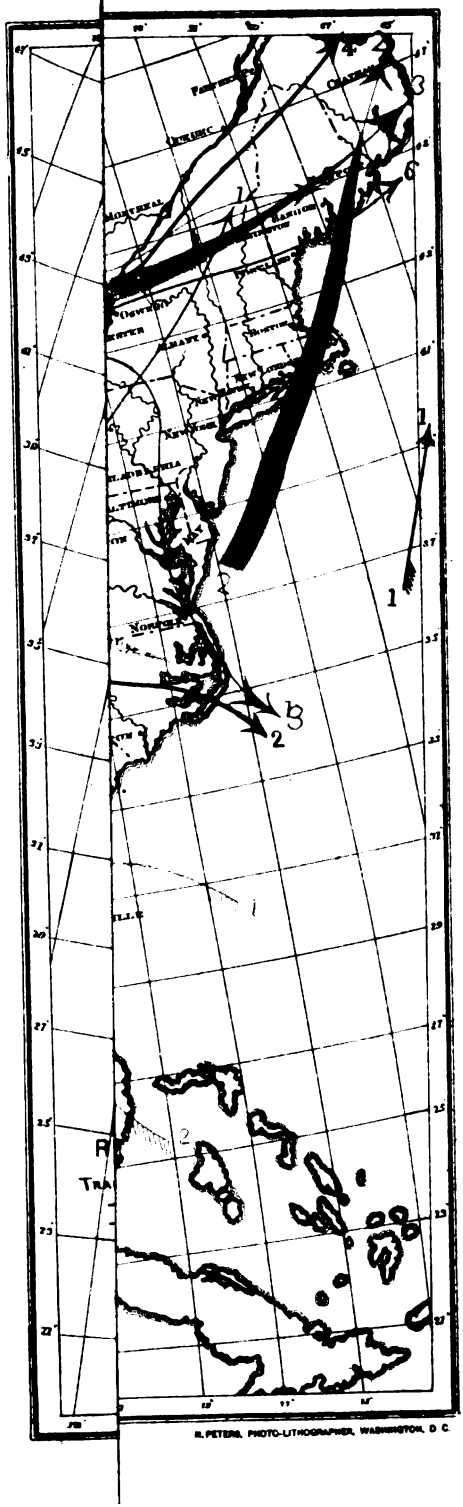
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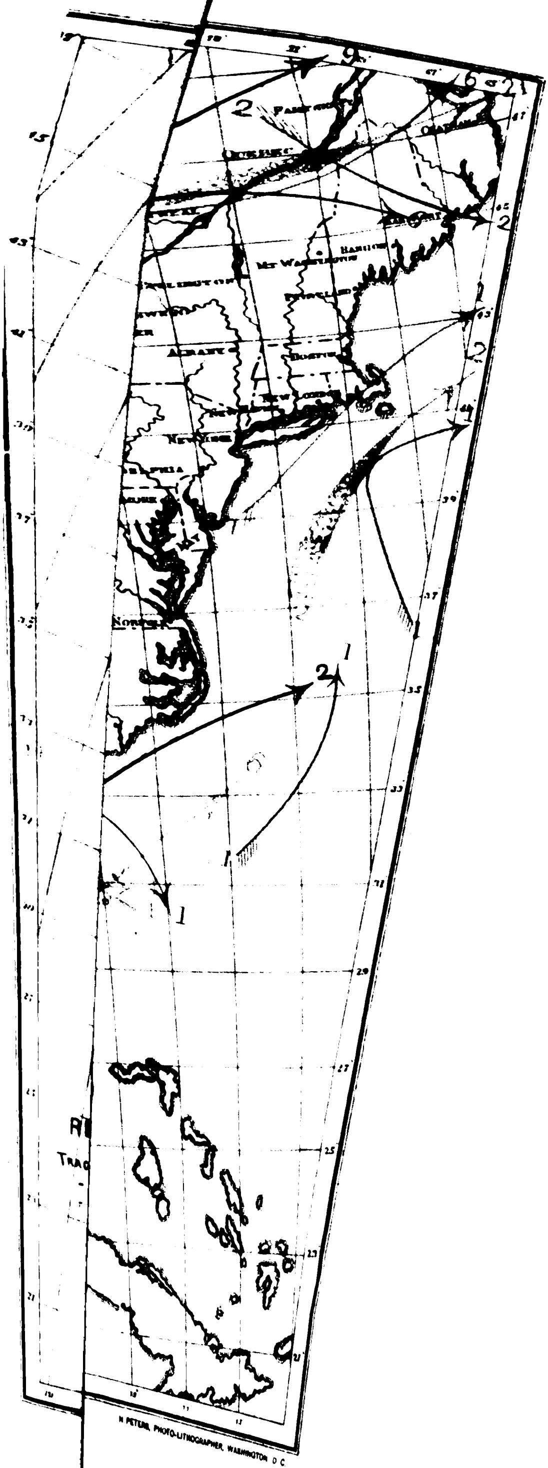
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